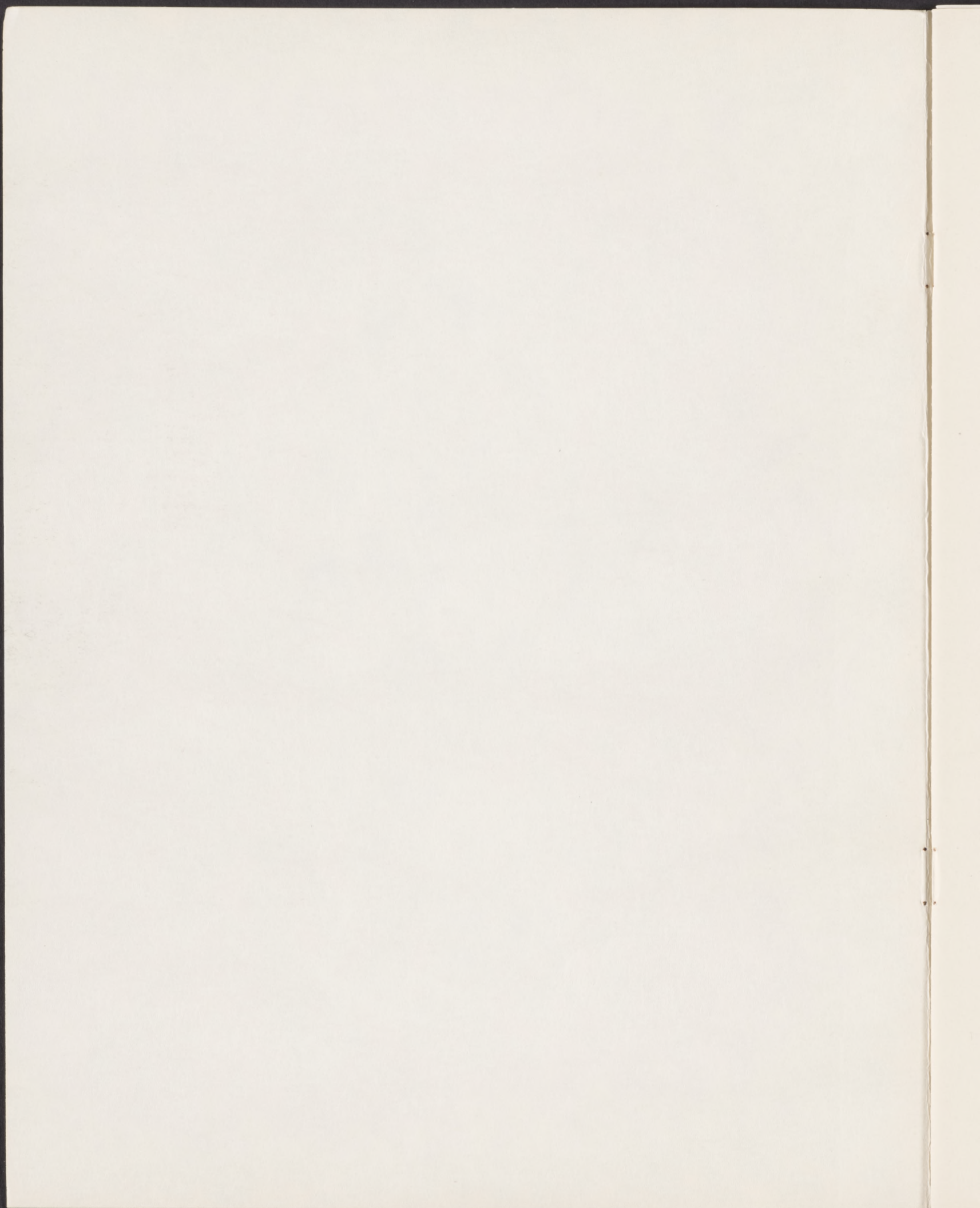


STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF CONSERVATION
DIVISION OF FORESTRY

File



the State Forester's 1969 REPORT



RONALD REAGAN
Governor

NORMAN B. LIVERMORE, JR.
*Secretary for Resources
The Resources Agency*

JAMES G. STEARNS
*Director
Department of Conservation*

THE STATE FORESTER'S 1969 REPORT



F. H. RAYMOND
State Forester

THE CALIFORNIA STATE BOARD OF FORESTRY

Whitford B. Carter, Chairman

Paul Aurignac

Ray Crane

Kelly B. McGuire

Howard K. Nakae

Waller H. Reed

Markham E. Salsbury

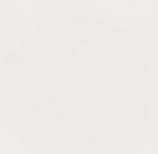
SACRAMENTO, CALIFORNIA
1970

REPORT OF THE

COMMISSIONER OF THE

STATE BOARD OF

THE STATE BOARD OF



REPORT OF THE

THE CALIFORNIA STATE BOARD OF FORESTRY

REPORT OF THE

REPORT OF THE

SAN FRANCISCO, CALIFORNIA

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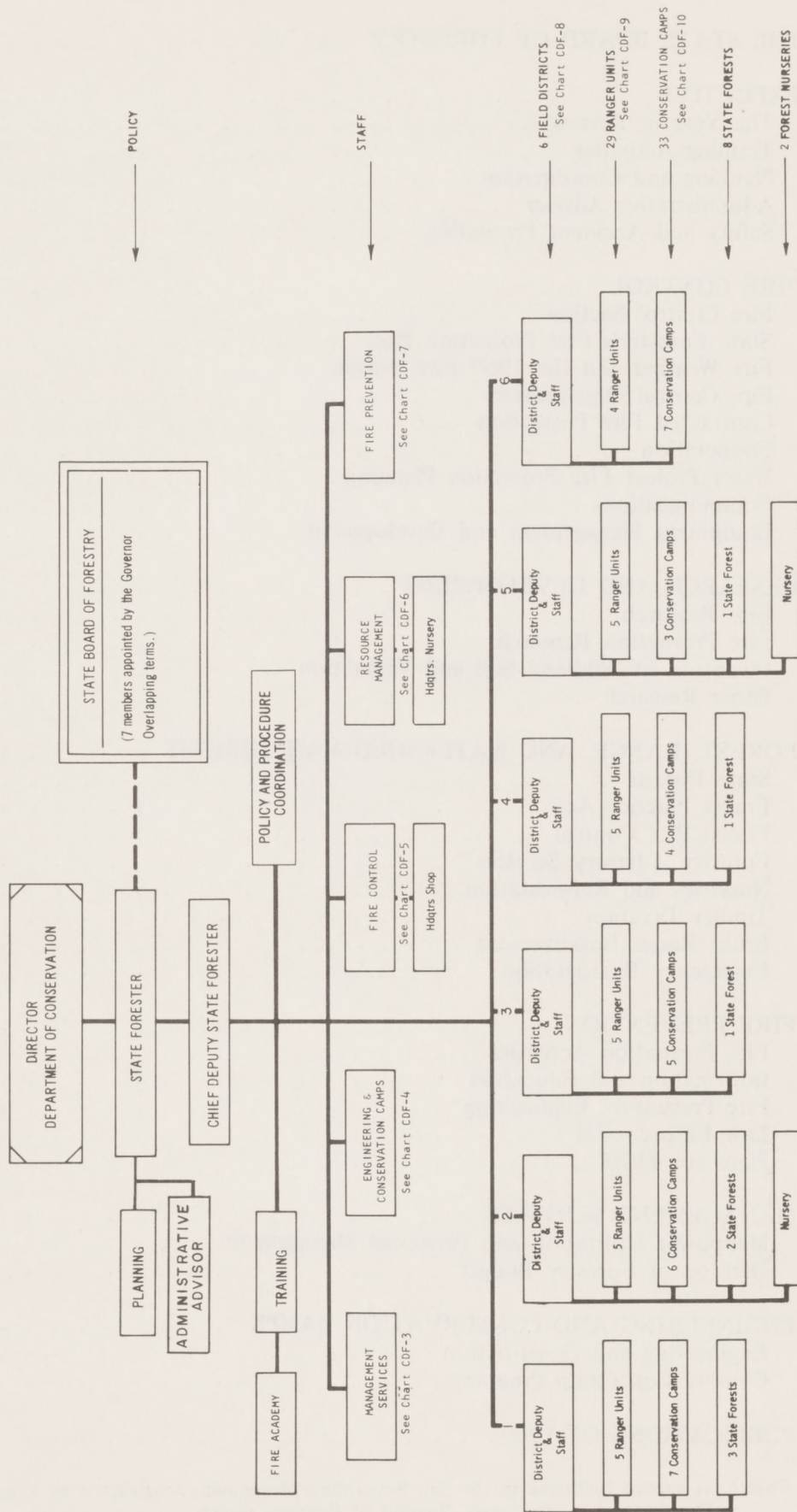
Cover: A shaded fuelbreak in the San Bernardino Mountains, constructed by Conservation Camp crews. *California Division of Forestry photo.*

DIVISION OF FORESTRY

DEPARTMENT OF CONSERVATION

THE RESOURCES AGENCY

STATE OF CALIFORNIA



THE STATE FORESTER'S 1969 REPORT

THE STATE BOARD OF FORESTRY

The California State Board of Forestry is constituted of seven members, appointed by the Governor. The Board represents interests of the state in acquiring and managing state forests, and in federal land matters related to forestry. Protection of the State's interests in forest resources on private lands also is a responsibility of the Board. As a policy-making body the Board develops and maintains a forest policy adequate for the state, and develops policies for general guidance of the State Forester in his administration of the Division of Forestry, under supervision of the Director of the Department of Conservation.

In 1969 the Board met in regular session ten times, during ten different months. Board members also attended various hearings, conferences, and committee meetings, and participated in meetings of other organizations concerned with forestry, natural resources, and environmental problems. They participated in work of timber maturity boards, which determine maturity of timber on previously cut-over lands, in several different counties. In total, these activities require an appreciable amount of the Board members' time.

Two matters requiring attention of the Board were development and adoption of regulations for use of state forests for recreation and related purposes; and review of the co-operative fire protection program carried on by the Division of Forestry and the various county governments. Early in the year involvement of the Division in flood control operations, removal of snow from state buildings in mountainous areas, and clean-up activities on beaches affected by the Santa Barbara oil slick—all on an emergency basis—were of vital interest to the Board. Legislation being considered by the State Legislature, related to both budget and other forestry and conservation matters required attention. At various meetings of the Board during the year hearings were held and approval given to a total of 43 new alternate plans, and amendments to 8 alternate plans already in effect; these alternate plans provide for higher standards of forestry practice than required by the Forest Practice Act during

harvest and regeneration of timber stands. The Board supported the multiple-use plan of the U.S. Forest Service for the Siskiyou Study Area. Attention was given to current activities in range improvement, forest fire potential for the 1969 season, revision of the Wildland Research Plan, and progress in fire prevention.

One of the most important matters coming before the Board in 1969 derived from a request of the Legislative Analyst to study possible methods of making the Forest Practice Act fully self-supporting by collecting fees from timber operators whose activities are inspected. This matter was studied exhaustively by Division staff and the Board; and views of representatives of the timber industry, agricultural and conservation organizations, and private individuals were presented to the Board at a public hearing in Sacramento in October. Consensus of this testimony was that there was no practicable method of levying equitable fees to make the Act self-supporting.

To perform its function effectively the Board of Forestry must be intimately acquainted with current conditions of forests, ranges, and other wildlands, and must have first-hand knowledge of today's environmental problems. To provide these kinds of information the Board includes a number of field meetings as an integral part of its annual program. During the field meetings professionally qualified specialists familiar with local conditions accompany the Board and brief members on problems, needs, and possible solutions.

In June, the Board held a field meeting in Madera County, jointly with its Range Improvement Advisory Committee. Work in brush range improvement was reviewed. It involves controlled burning of woody vegetation, revegetation with improved forage plants, and follow-up measures and grazing management to maintain the gains made. Ranchers in this area have been actively pursuing this kind of range improvement on a co-operative basis since before 1946. The Division of Forestry and other agencies have established several research areas in the county, where a great deal of knowledge has been

gained. Impacts of subdivision and other population pressures on these wildlands were reviewed also.

Preceding the July meeting in Eureka, the Board visited a number of areas to personally observe timber harvesting practices, forest regeneration, stream clearance problems, and other forest and range resource activities of the Humboldt area. In August, a field meeting in the Lake Tahoe Basin provided opportunity for seeing operations at the new plant for tertiary treatment of sewage, and other solutions to waste disposal; sedimentation and eutrophication of Lake Tahoe; impacts of accelerated use on public recreation lands; and other current ecological problems affecting environmental quality in the Tahoe region. The field meeting in southern California in

September devoted one day to observation of facilities and fire protection problems in San Diego County; another day was given to Schedule A operations, fuelbreaks as fire defense measures, and other fire protection problems in Orange County.

Field experience of this kind provides accurate, first-hand knowledge on the ground, indispensable for keeping Board members currently abreast of the impacts of people and their activities on natural resources, wildlands, and environmental conditions.

There were two changes in Board membership during 1969. The term of Leslie O. Cody expired; Waller H. Reed was appointed as his replacement. Markham E. Salsbury was appointed to fill a vacancy created by expiration of the term of Philip Abrams.

EXECUTIVE

The Year in Review

During the year 1969, State Forester Raymond:

- Joined a group of federal, state, and county officials in an inspection of flood-damaged areas of southern California, via helicopter.
- Participated in a Society of American Foresters-National Research Council symposium in Roanoke, Virginia. Consideration of education needs for foresters was one of the meeting highlights.
- Worked with the CM-2 Study Committee of the National Association of State Foresters at meetings in Washington, D.C., and Columbia, South Carolina. The committee recommended that an additional two million dollars be added to CM-2 funds.
- Initiated action to consolidate the Amador and El Dorado Ranger Units into a single Ranger Unit; and to similarly consolidate the San Benito and Monterey Ranger Units. This included several meetings with Boards of Supervisors of the four counties to explain the need for this action.

- Attended the Council of Western State Foresters in Portland, Oregon.
- Joined Chief of the Forest Service Edward Cliff and Assistant Secretary of Agriculture Behrens in a tour of Tahoe Valley and California Division of Forestry Service Forestry projects.
- Attended a meeting of the American Forestry Association in Colorado Springs, Colorado.
- Attended a meeting of the National Association of State Foresters, in Portland, Maine.

Chief Deputy State Forester Moran:

- Participated in a tree-planting ceremony at the Sierra-Cascade Logging Conference at Cal-Expo, in Sacramento, along with W. B. Carter, Chairman of the State Board of Forestry.
- Actively participated in making the Division's new fire management training film "Command Decision."

- Accompanied State Forester Raymond to the Council of Western State Foresters, in Portland, Oregon.
- Participated in the meeting of the fire chiefs of "contract counties"--Los Angeles, Kern, Santa Barbara, Ventura, Marin--and District Deputy State Foresters. This is an annual meeting for co-ordination and interchange of information.
- Represented the State Forester at a meeting of the California Association of Soil Conservation Districts, held in Sacramento.

Training Activities

The California Division of Forestry Fire Academy at Ione completed its second full year of operation. During this period the new special fire exercise area was completed to the point where it will be in full use when Basic Fire Control Courses begin at the close of the Northern Fire Season in October.

Facilities include a two-story block structure designed to permit simulation of all types of structural fires. Students practice use of ladders; venting techniques; salvage; single and multiple truck attack; hydrant hoselays; rescue techniques; and use of self-contained breathing apparatus under actual fire conditions. Additional live fire exercise units include a mock bulk plant loading dock, fuel storage tanks, oil field derrick platform, gasoline pipelines, and liquid petroleum gas pipelines.

Highlights of Academy activities for the year include five standard five-week Basic Fire Control courses--a total of 2,945 man-days of instruction; three two-week seasonal Fire Apparatus Engineer courses, 620 man-days; one Heavy Forestry Equipment Operator school, 500 man-days; LPG Maintenance, 80 man-days; Automotive Tune-up, 80 man-days; Plans Boss Training, 96 man-days; Equipment Maintenance Foreman Training, 175 man-days; Helitack Training, 96 man-days; Electrical Maintenance, 80 man-days; Law Enforcement, 1,932 man-days; --a grand total of 6,604 man-days of training at the Fire Academy.

The Academy staff completed a field survey of fire training effectiveness for graduates of the 1968-69 Basic Fire Courses to insure that

skills currently being taught reflect the needs of the ranger units. Recommendations gleaned from the survey are currently being incorporated in the Basic Fire Courses to be given at the Academy in 1969-70.

Division training effort at the District and Ranger Unit level involved some 10,600 man-days for permanent employees. Some 5,000 man-hours of effort were devoted to management, supervisory, and safety training. Division seasonal employees received 7,700 man-days of fire control crew training.

Specialized training assignments for Division personnel included participation in the following programs: The California Fire Services Staff and Command School, Heating and Air Conditioning Maintenance, Program Management, Arson and Fire Investigation, and Pesticide Use in the Environment.

Training Committee recommendations resulted in the development and implementation of a standard Plans Boss course, an Initial Attack Fire Management course, and a Facility Maintenance course during the year.

Fire Prevention Training--A pilot course for Fire Prevention Information and Education training was held at Oroville, with a statewide instructor staff. The course is being refined and will become the nucleus for Basic Fire Prevention training.

The Basic Peace Officer course consists of six weeks of training. It follows as closely as possible the program of the California Commission on Peace Officer Standards and Training (P.O.S.T.). The Division's "Basic" training has been adapted from P.O.S.T. basic training requirements, plus material developed to meet the needs of the Division; it is given in two-week increments.

Emphasis during the first two-weeks is on initial investigation and fire- cause determination. This reflects both initial training needs for those who will complete more of the "Basic" program, and training needs for Fire Captain and Fire Apparatus Engineers who make the majority of initial investigations and investigation reports. During the past year, 70 students completed the 240-hour Basic course. Sixty-nine students reached the 160-hour level, and 72 students completed the first 80 hours.

Thirteen students completed a condensed one-week law enforcement course for administrators. Ten students completed a

one-week course of advanced training for arson investigation unit members.

All of the approximately 2,225 man-days of training were conducted at the Division of Forestry Fire Academy at Ione, except one course. This course -- 240 man-days of training -- was held at Nevada-Yuba Ranger Unit Headquarters because space was not available at the Academy.

A training course in the art and science of taking motion pictures, and use of motion picture cameras was given to 12 Division of Forestry fire prevention officers by Clay Dudley, Chief of the Graphic Arts Division, Department of Water Resources.

Planning and Coordination

Continuing study of systems--their descriptions and the coordinated development of criteria and standards--was a major task of the Planning Coordinator in 1969.

The new Program and Budgeting System (PABS) and the Program Time Reporting System (PTRS) received a full year's operational testing. Analysis and review of data indicates the systems will have value in analysis and control of operations. The Division's budget was prepared in program format; budget discussions and cost allocation techniques were developed on a program basis. The formats developed were also useful for planning purposes.

Approval of the State Forester's Fire Protection Plan by the Board of Forestry in November marked a major milestone in planning efforts. This was the first complete review and revision of the Fire Plan since 1956. The fire protection system descriptions and objectives are now more uniform with other planning and budgeting formats and criteria. This creates better understanding of the system and more significant cost comparisons. Future amendment should also be simplified.

A contract for a feasibility study of improvements to the fire control dispatch system was awarded to Systems Development Corporation. Preparing bid procedures and a request for proposals for this type of "soft ware" contract was time-consuming. The study was initiated late in the year; results will be available in 1970. Investigation of coordinate systems for mapping and for fire location for dispatching continued within the Division.

The Planning Coordinator continued to serve on an interdepartmental planning and study team working on a proposed Protected Waterways Program. This work was authorized in 1968 "to provide for the conservation of those waterways of the State possessed of extraordinary scenic, fishery, wildlife, or outdoor recreation values." A student intern was hired during the summer to search the literature for waterway programs. The subject is a difficult one to attack because of the complex physical, biological, legal, and political nature of waterways. The Resources Agency provides leadership for the study. The major input to the study from the Division has been concerned with forestry and other land uses adjacent to waterways. A field review of Colorado River problems was attended.

Economic studies of values of products and property protected by wildland fire protection agencies in California continued. These studies were part of a national study of "values protected" in connection with the Federal Clarke- McNary Act, sponsored by the National Association of State Foresters.

Establishment of the Redwood National Park caused a fire protection responsibility problem. This was resolved in June when a protection contract between the National Park Service and the State Forester was signed.

Considerable time was spent on proposed reorganization plans, including possible consolidation of district organizations. Studies showed no cost gains would be accomplished by consolidation.

Proposals for a study of field Assistant Ranger district geographical boundaries and criteria for such areas were made. Testing of criteria will continue in 1970, for the study, which was requested by the legislature.

The Wildland Research Plan, a cooperative effort of the Board of Forestry, Division of Forestry, and private organizations, universities, and federal research and administrative agencies, was revised in 1969. The revised Plan will be published in 1970.

Interest in open space legislation and programs was evident in both the legislature and executive branch. Several legislative hearings were held concerning modifications of the Williamson Act. Meetings were held with local

officials to assess effects of entering State Forests into the open space program.

Export of logs and wood chips to Japan continued to increase in 1969. This caused concern for domestic timber supplies, and the effect on domestic markets. Reports were made to the Board of Forestry and other executive agencies concerning this trade.

Introduction of the proposed National Forest Timber and Conservation Act of 1969 in Congress caused a flurry of analysis and other activity. Concern was voiced about effects of the proposed Act on multiple-use, and especially wilderness values on National Forests. After amendments were made to the original bills, the proposed legislation was endorsed by the Board of Forestry and Governor Reagan. Several proposed additions to the National Wilderness System were analyzed and study results forwarded for Board of Forestry, executive, and legislative action.

Extension of planning assistance to local, regional, and state planning authorities was stressed during the year. The "Fire Safe Program" of planning fire safety in wildland subdivisions and developments was stressed at the field level. Other planning agencies were advised concerning air pollution, fire protection, solid waste disposal, and economic development of forest and wildland resources. Water quality control and analysis also received attention.

Activities of the National Public Land Law Review Commission resulted in publication of a large number of studies in 1969. Many of these reports were reviewed to fulfill the Board of Forestry's mandate to maintain an adequate forest policy and represent the state in public land matters. All multiple-uses of public lands and federal law and policy pertaining to these uses were reviewed. However, principal emphasis was placed on review of reports dealing with public land timber and grazing resources.

Administrative Advisor

For the first time, in any state, a full-time attorney was employed by a forestry division when the position of Administrative Advisor was filled early in 1969.

Main functions of this position are: to speed up enforcement of Forest Practice regulations; and more effective recovery of suppression costs, an important tool of law

enforcement for fire prevention. Closer liaison with the field has been established, and a feeling of confidence has been engendered with the realization that their problems are given closer attention.

Upon advise and assistance of legal counsel, among many other procedural changes, the following acts were effected:

- Billings for fire suppression costs have been speeded up; thus suppression costs recovered are available sooner for use by the state. If necessary to litigate the matter, memories of witnesses are fresher.
- Elimination of needless paper work in a large number of alleged violations.
- Curtailment of reading time at Board meetings for Alternate Plans under consideration by the Board of Forestry.

As in any endeavor, advise of counsel will save time and money—sometimes serious blunders. The Division is no exception, the salutary effects are manifest.

Safety and Accident Prevention

Accidents in any part of an organization are an indication that something is not functioning well. If we accept the concept that an efficient organization is a safe organization, then safety is in one of the best measures of efficiency. The things that safety measures are not subject to speculation, because lost time injuries and costly accidents can't be ignored or hidden; they serve as a good indicator of efficient operations. Effectiveness of the Accident Prevention Program is evidenced by the continual decline in number of lost-time injuries per million man-hours worked.

INJURIES TO DIVISION OF FORESTRY PERSONNEL	
FISCAL YEAR ENDING	"LOST TIME" INJURIES (PER MILLION MAN-HOURS)
1964	44.23
1965	53.71
1966	42.99
1967	47.52
1968	32.61
1969	20.60

Accident prevention is not a sometime-someplace activity. It must of necessity be integrated into all staff and line functions of management. The safety program plays a vital role in organizational structure; unlike other elements it seeks to strengthen all organizational functions. Actually the safety function works in any part of the organization to help the management process, for example: training and education, protective equipment, equipment design, personnel management, legislation, inspections, workmen's compensation.

Basically, positive interest and concern of line management is the foundation for an effective accident prevention program, therefore evaluations are necessary for control purposes. Statistics are kept on injuries, and on automotive accidents. The former are kept on a quarterly basis while the latter are calculated by six-month periods. They serve as an effective tool for top management in determining which line managers need to reduce accidents and injuries. Once a year accidents are tabulated by age, position, activity, and part of body injured, to show problems needing special attention. For example, back injuries are numerous and very disabling; therefore, management has concentrated on reducing this type of injury.

Much of the Safety Coordinator's time is spent in education and training. Every fire truck-driver class is given safety instruction to impress upon new employees their responsibility and accountability as employees and first-line supervisors. It is imperative that first-line supervisors realize their importance in conducting operations efficiently and safely, since this is where the action is.

District and ranger safety meetings are attended to talk over methods of improving operations and to inform or give training in specific problems.

Time was also spent with the Fire Academy personnel to inform them of the need for training to prevent accidents; and to work up a testing program for various personnel safety protective items.

The underlying cause of most accidents (85 percent) is human failure. Employees have been studied to see what changes in personnel management might reduce accidents and injuries.

The rehabilitation program is being further developed to expedite getting permanently injured or sick employees out of hazardous employment, and into work that will not further

aggravate disabilities or allow chance for accidents.

Background information has been developed for legislation to retire employees at age 55, for various legislative hearings. Early retirement will get older personnel out of fire fighting--a young man's job--thereby reducing chance for accidents and injuries.

Preemployment testing and physical examination standards have also been developed and are being reviewed. With such testing and examinations, persons with existing physical, emotional, or health problems will be screened from among eligible candidates. In doing this, the prospective employee will be protected and a better work force established.

Physical conditioning of permanent personnel in fire fighting classes is being studied for determining work related standards for various classifications. Employees will be tested to determine if they are employable for strenuous work. At present there are several physical conditioning programs in existence in various districts to encourage employees to maintain physical fitness.

People in good physical condition are not as likely to have illnesses or accidents; and if involved in accidents they are much less likely to be injured. Further a person in good physical condition, if injured, will recover in much less time than the person in poor physical condition.

Work-duty statements have been developed for fire fighting classes to give the attending physician information on exposures his patient will face if or when he returns to work. Using this information the doctor can make an intelligent, proper decision whether an employee should return to work.

To aid in reinforcing attitudes toward accident prevention, to train managers in what constitutes unsafe acts and conditions, and to upgrade facilities and equipment, accident prevention inspections are carried on by the districts. The safety coordinator accompanies district personnel on many of these inspections.

Many dollars can slip out in compensation costs for injuries or diseases if close contact is not maintained with State Compensation Insurance Fund (SCIF). Money has been saved through compromise and release settlements, eliminating illegal charges or claims, and by making sure supervisors differentiate between first aid cases and those requiring professional medical attention.

During the 1968-69 fiscal year direct costs for industrial injuries were \$28,700 less than for

the preceding fiscal year. Allowing a very conservative ratio of 4 to 1 for indirect to direct costs, the total reduction is about \$143,000 in savings. This saving was made despite increases in both medical costs and workmen's compensation benefits. As an example, temporary disability payments were increased from \$52.50 to \$87.50 per week. Costs of

workmen's compensation for the last three years was:

FISCAL YEAR	COSTS OF WORKMEN'S COMPENSATION
1966-67	\$ 430,692
1967-68	409,852
1968-69	381,184

FIRE CONTROL

Primary objectives of the fire control program are prevention of forest fires on lands of statewide interest, and control of fires which do occur to hold damages at a level where the yield of economic goods and social benefits from the wildlands will not be impaired. Principal program responsibilities are design and operation of a fire attack and control system; fire control planning and operations; and civil defense and other emergency operations, including statewide dispatching of forces.

Fire Control Section

The State Forester has delegated authority for fire control to a unit of his staff known as the "Fire Control Section." Under direction of a Deputy State Forester this section has staff responsibility for the following functions:

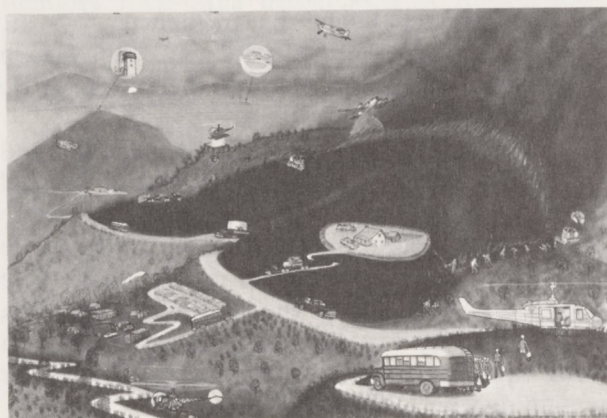
- Fire control operations within the Division of Forestry.
- Cooperative fire control operations.
- Dispatch and communications.
- Air attack operations.
- Mobile equipment management.
- Fire protection analysis and planning.
- Operational research.

The State Forester's Fire Protection Plan

Since 1964 the Division has been revising its Fire Protection Plan to meet the challenges of changing times, changing problems, and

changing technology. During 1969 a concentrated effort was made to furnish a complete, modernized fire plan to the State Board of Forestry and the State Legislature.

As a result of this effort the State Board of Forestry approved the 1969 revision of the State Forester's Fire Protection Plan at its November meeting; the plan was submitted to the Legislative Budget Committees on December 1.



Fire fighters and fire fighting equipment of the California Division of Forestry functioning as an organized team to control a rapidly spreading wildfire. Painting by David Rodriguez, Division of Forestry delineator, used in explaining the revised State Forester's Fire Protection Plan to the State Board of Forestry.

The planning process was based on an analysis of the wildfire threat to values existing on forest, watershed, and range lands protected by the Division and to similar lands protected under contract by the U. S. Forest Service and Contract Counties. Fire protection objectives were reviewed and fire protection successes evaluated against these objectives. Standards and criteria for the various components of the suppression organization were considered and judgement and experience were applied within

the framework of these factors to determine the organizational needs for basic fire protection.

The cooperative nature of fire protection in California was a basic consideration in the planning process. Consideration of fire control resources provided by private citizens, industries, local government organizations, and the federal agencies is interwoven through the plan.

The completed plan is a complex document reflecting the California wildland fire problem, delineating specific protection needs, and providing a basis for evaluation of changing problems and needs. To be useful, a plan must be subjected to constant study and modification, and the State Forester's Fire Protection Plan is no exception to this rule.

Fire Weather and the 1969 Fire Season

Storms of the winter of 1968-69 caused floods and earthslides, and a record snowpack. Early in the year speculation began as to how the fire season might be influenced by the over-abundant water supply. As the season developed, it appeared that there was little direct influence.

Heavy storms ended in March and statewide precipitation was barely normal thereafter. By early May range grasses were beginning to cure in the foothill areas while many feet of snow remained in the Sierra. Fire season was declared in the Southern California District on May 1; in the North Coast District on June 1; and at intervals between in the remaining four Districts.

June and early July brought relatively cool weather with below normal fire danger, but around the middle of July an abrupt change in character of the fire season took place. A warm ridge of high pressure established itself over the state and remained almost without interruption for the next two months. Temperatures everywhere, except portions of the coastal strip, remained well above normal for extended periods. Indicative of this sustained heat was a statistic that emerged from Red Bluff on September 13 when it was noted that it was the 77th consecutive day with a temperature of 90 degrees F. or higher. Fire danger almost everywhere climbed to relatively high levels and remained there, with occasional periods of very critical conditions.

Cooling began in late September and

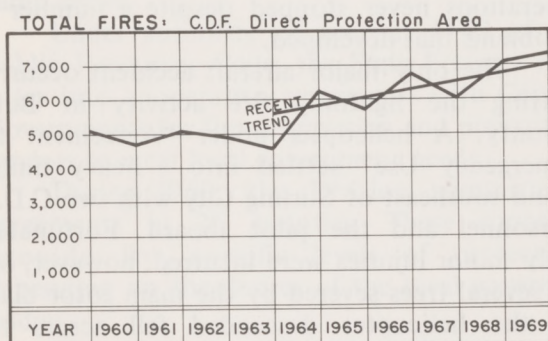
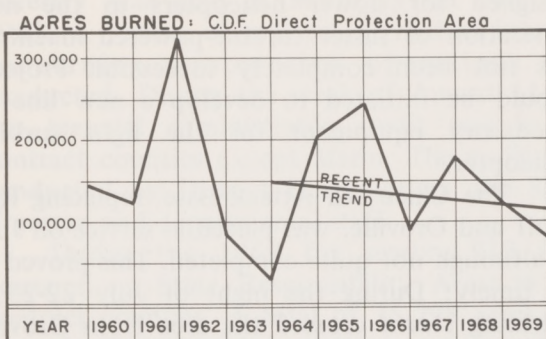
continued through October. Rains were a little late in making their appearance on the North Coast but had occurred in sufficient amount to allow the northern portion of the North Coast District to terminate fire season on October 20. Other areas followed at intervals and by November 6 fire season was closed in five Districts. It was necessary to wait several more weeks--until December 19--for termination in the Southern California District.

The total statewide seasonal fire weather severity for the period June through October, in twelve sample fire danger rating areas distributed throughout the state, shows 1969 to be seventh in order of severity in the ten year period of 1960-1969, with 1961 still the most severe and 1963 the least severe. Ten of the twelve sample areas accumulated above normal fire weather severity but in only two areas did this approach a new record high.

Highlights of the 1969 fire season were:

- A relatively dry spring that partially offset the late winter moisture surplus.
- A reversal from cool early fire season conditions to a sustained hot period.
- A widespread spontaneous thunderstorm situation in early September in the Central Coast District.
- Above normal amount of lightning activity along the Sierra.
- Continuing the trend of recent years, fire occurrence up to a record high and acreage loss down.
- Number of fires of over 300 acres was only 27, compared to a 5-year average of 56 per year.
- Several late season north winds in Northern California and several Santa Ana winds in southern California.

The Division suppressed more fires in 1969 than in any previous year. Although there were more lightning fires than usual, the increased number of fires was mostly due to the steadily increasing population pressure on the wildlands.



Total area burned (above) in State Responsibility Areas protected by the California Division of Forestry in 1969 was the second lowest in recent years, continuing the downward trend of acreage burned annually. Total number of fires in 1969 (below) was the highest on record, continuing the recent upward trend in fire occurrence.

Preliminary reports indicate that during 1969, the Division responded to 4,414 fires which burned wildland fuels, and 2,902 fires in wildland areas which were kept confined to vehicles, structures, dumps, or other places in which they started. Thus the Division responded to approximately 7,316 fires which burned or threatened wildlands.

In spite of the increased number of fires each year, there is a general downward trend in acres burned. Although seasonal totals vary greatly—depending on the aggregate effects of weather—1969 was the 3rd consecutive year of decreasing acreage burned. In 1969 there were approximately 78,890 acres burned. The mean for the previous five years is 165,572 acres.

Fire Control Organization

In 1969 the Division's fire control organization included:

- 235 Initial attack crews operating 375 forest fire trucks.
- 58 Initial attack bulldozer-transport units.
- 2 Helitack crews.
- 21 Contract air tankers operating out of 12 air bases.
- 77 Forest fire lookouts.
- 4 Aerial patrols.
- 137 Conservation camp crews operating out of 33 conservation camps.
- 28 Ranger Unit headquarters providing dispatch and logistic services for the fire suppression organization.

To utilize the suppression organization as a flexible, mobile fire attack force, a statewide system of dispatching is maintained. This system includes local area dispatching at Ranger Unit headquarters; Regional area dispatching at six District headquarters; and statewide coordination of dispatching at the State Forester's Office.

To evaluate effectiveness of the dispatching system and to explore methods of improvement, a feasibility study for improvement or automation of the dispatch and control system was begun in 1969. The study is being performed by the System Development Corporation of Santa Monica.

The basic objective of the study is to determine if it is feasible to determine in advance or otherwise modify command and control procedures to minimize the time, manpower, and probability of error in deploying the force, and to maximize effectiveness of the force deployed. Use of modern management and information systems, including automation, are incorporated into the feasibility study. Constraints include the need for judgmental decisions under emergency conditions and cost effectiveness considerations.

Results of this study, to be available in April 1970, will be used in the continuing efforts to increase dispatching effectiveness to meet the changing wildland fire problem.

Termination of the 1968 fire season also marked the end of a three year contract period for airtankers. Action to obtain operators for 1969-1971 was started in November 1968 with

prequalification applications sent to the 25 operators known to own the types of aircraft used as airtankers. Replies were received from only 11 of the companies solicited. Two were not interested, one was a new company being planned through dissolution of an existing firm (never consummated), two had no prior experience and proposed to convert 3 aircraft if they were awarded a bid, and one was declared bankrupt shortly after submitting his application.

It was evident the total number of airtankers available approximated the number being used by all agencies; and that contracting based on competitive bids would not result in true competition. Therefore, the Division participated jointly with the Forest Service in negotiating a flight rate with those operators selected for use in California. This was undertaken in late March and negotiations completed by June 1.

The airtanker fleet remained at 21 planes under contract. The Forest Service needed 14 planes for normal protection; one plane was added for the 1969 season because of winter storm damage to their access roads in Southern California, bringing their total to fifteen. All aircraft were available to both agencies.

A preliminary review of air attack expenditures indicates somewhat less flying during the 1969 season although the number of fires attacked remained about the same as 1967 and 1968.

Additional Helitack crews were requested in the 1969-70 budget to improve fire control capability. Two complete crews with equipment and funds for contracting for light turbine helicopters were approved in the final budget bill. Crews were located at Middletown (Lake County) and Sanger (Fresno County). Each consisted of a year-long Foreman I, a seasonal Foreman I for relief, a seasonal Truck Driver, and 5 Firefighters.

In June, personnel were selected and bids for the two helicopter contracts solicited in anticipation of approval. The helicopters were equipped with radios and firefighting accessories; after a week of training, the crews and helicopter pilots reported for duty the second week of July.

In reviewing the Helitack crew activity, it appears there is need for training field personnel in better utilization of helicopters, and better coordination and integration with other fire-fighting aircraft. Also, adapting accessories

designed for slower helicopters to the new generation of faster turbine-powered machines has not been completely successful. Projects should be initiated to develop a new line of accessory equipment for the light turbine helicopter.

The Chico Air Attack Base, replacing Red Bluff and Oroville, was placed in service on July 1, although not quite completed. This proved to be timely: During the night of July 22-23, a lightning storm crossed the area from Oroville Dam through the southern part of Tehama County, leaving 75 fires in its wake. Handling 10 to 14 airtankers during the next three days taxed the partially completed base; however, operations never stopped despite a number of problems that developed.

The only major aircraft accident occurred during the lightning fire activity in Butte County. A helicopter under "Agreement for Emergency Use" settled into a heavy timber stand southeast of Stirling City with two C.D.F. personnel and the pilot aboard. Fortunately only minor injuries were incurred; however, one of several trees severed by the main rotor blade as the helicopter descended fell across the machine, damaging it beyond repair. Two other helicopter incidents occurred during the season causing the pilots to make emergency landings, both of which were completed successfully.

A firefighter was seriously injured from an airtanker drop on a fire in the Santa Clara Ranger Unit. This was the Division's first major injury from an airtanker drop, and was investigated thoroughly to determine the cause. It was determined to have been an "accident" with a smoke-obscured target, rapidly rising terrain, and the firefighter's concern for other personnel in the target area all being contributing causes.

Contracted Fire Protection

The counties of Kern, Los Angeles, Marin, Santa Barbara, and Ventura continue to contract with the Division of Forestry for fire protection of 4.25 million acres of State Responsibility Areas. Statutory authority for the state to enter in contracts for this protection is contained in Section 4142 of the Public Resources Code.

The 1969-70 Fiscal Year budget for performance under contracts for protection of these lands is \$2,787,584.

A meeting between the contract county Fire Chiefs and the California Division of

Forestry was held in Monterey on July 11, 1969. A review of matters of mutual interest concerning cooperative operations was conducted. During the week of August 11-15, the biennial administrative audit was in all contract counties except Marin. The audit was conducted by District Headquarters, the State Forester, and departmental staff.

During the 1969 fire season, 913 fires occurred on State Responsibility Areas in the contract counties. A total of 35,298 acres was burned. Considerable assistance was provided contract counties for extended attack and major fire situations. The assistance included firetrucks, bulldozers, aircraft, and conservation camp crews.

Under authority of Section 4142 of the Public Resources Code, the State Forester may enter into cooperative agreements with County Governments for fire suppression and prevention services to meet local government needs.

During 1969, the Division administered agreements in 26 counties. These contracts provide for specific levels of protection, depending on the desires of the local governing bodies.

The costs over the years have steadily climbed from a small appropriation to the current budget of \$10,235,642. The current organization is shown in the table.

ORGANIZATION FOR ADMINISTERING COOPERATIVE AGREEMENTS WITH COUNTY GOVERNMENTS

Year-long positions	692
Seasonal positions	184
County-owned Fire Stations	180
County-owned Firetrucks	262
County-owned Water Wagons	21
County-owned miscellaneous (automotive equipment)	165

After 23 years Kings County terminated its contract with the Division, and will operate its own fire protection service, beginning on January 1, 1970.

The local government fire protection program has proved to be effective and economical for local governments, and increases the flexibility and utilization of manpower of the Division.

The U. S. Forest Service directly protects 24 million acres in California from fire. A little over five million acres of this total is private land. The state contracts with the Forest Service for protection of private land within the Forest Service protection boundary. Some 52 fire crews, 20 lookouts, and 11 patrolmen are provided, at a cost of slightly over 1.6 million dollars for 1969. Inspections of 45 of these fire crews, 11 lookouts, and eight of the patrol positions were completed in 1969 by the Division accompanied by Forest Service personnel.

Cooperation

Even though fire incidence was well above average, acreage burned was less than half the normal average. Much of this reduction can be attributed to the close working relationships between fire agencies throughout the state. The Division maintains this cooperation through formal agreements and close day-to-day working relationships with all fire agencies, whether they be large, such as the U. S. Forest Service, Department of Interior, Contract Counties; or small, such as small fire protection districts and volunteer fire departments. Close cooperation is also maintained with other governmental agencies, again usually through formal agreement. Maintaining this cooperation is the constant duty of all Division employees; so consequently again in 1969, numerous interagency meetings, conferences, training sessions, were attended by all levels of Division personnel. Participation in these affairs, along with close day-to-day working contact with the other agencies, helps to maintain the cooperation now in effect.

Water Project Fire Protection Planning

Planning efforts continued on two Type IV River Basin studies*, the North Coast Study,

*Type IV river basin studies are comprehensive plans developed under Section 6 of Public Law 566, for purposes of (1) flood prevention, or (2) conservation development, utilization, and disposal of water, and thereby protecting the nation's land and water resources. The federal government cooperates with states and their political sub-divisions, soil and water conservation districts, flood prevention and control districts, and other local public agencies in carrying out this program.

and the Central Lahontan Study on the east side of the Sierra Nevada. These studies are in cooperation with both federal and state agencies. From all indications there will be at least two additional Type IV studies initiated next year.

Installation of land treatment measures (fire protection, approximately \$254,000), on the Escondido Creek Project in San Diego County is continuing under Public Law 566. Negotiations are in progress to reach agreement with the sponsors which will form the basis for installation of land treatment measures (fire protection, approximately \$244,000) on the Upper Llagas Creek, Public Law 566 Project. Fire protection measures (approximately \$181,400) included in the Main Street Canyon Public Law 566 project will be installed by the USFS on both federal and privately-owned land.

Negotiations are continuing to establish the part that the USFS-CDF and Santa Barbara County Fire Department will play during installation, operation, and maintenance of fire protection measures to be installed on the Carpinteria Public Law 566 project.

Fire protection needs on numerous reservoir projects were planned, in cooperation with federal, state, and local agencies participating in water development: Corps of Engineers, Bureau of Reclamation, U. S. Department of Agriculture, Federal Power Commission, State Department of Water Resources, State Water Quality Board, Flood Control Districts, municipal water districts, and special services districts. Participation involved review of Division of Forestry interest; preparation of fire plans, if needed; and recommendations to wildland managers, when applicable. To illustrate: the Corps of Engineers has advised they will endeavor to carry out the fire protection objectives recommended by CDF involving access, fuelbreaks, helispots, and other suppression needs, and fire precautionary measures needed during construction, recreational development, and operation of Corps projects. Division personnel participated with the Corps of Engineers in a review of fire protection measures installed and maintained by the Isabella, Success, Terminus, Pine Flat, and Black Butte Reservoir projects.

The Bureau of Reclamation and the State Forester have agreed on a basic fire protection plan for the Auburn Reservoir Project. Negotiations are under way to intensify existing protection in the area under contract with the

Bureau, to offset the risk of fires starting from construction activity.

The Division has completed a review and submitted comments on the preliminary draft of "Major Water Issues" prepared by the National Water Commission, which included numerous suggestions for consideration involving related land resources.

Recommendations were made to the National Water Resources Council on procedures for evaluation of water and related land resources projects.

Communications

During 1969, new radio equipment was installed implementing certain planned portions of the radio system:

- New Microwave equipment was installed, completing the basic microwave system; each Ranger Unit now has the air net intercom system and the green phone system to be used to expedite fire dispatching.
- New aircraft radio equipment was installed in air tankers, "Airco" light aircraft, and helicopters. Also, the air net system was changed to allow Districts to have their own net so operations would not interfere between Districts. However, because of frequency shortages, the North Coast and San Joaquin districts now share the same air net; the Central Sierra district has its own air net; and the Sierra Cascade, Central Coast, and Southern California districts retain the previous air net frequency. Some interference between Districts is still present, but not to the extent that existed when only one frequency was used in aircraft statewide.
- Five additional state net mobile relays, which interconnect to the microwave system were added. This provides state net communication in certain areas which were previously without it.
- Airport radio base stations were purchased and installed in the last four airports. Each airport now has the basic planned airport radio system including the aeronautical multicom frequency 122.9 MHz.

Planning continued as necessary to make certain changes to the radio system:

- Specifications were completed for new mobile radios to operate on state, district, and local nets; 502 replacement and additional radios were ordered to be installed before the 1970 fire season.
- Specifications were written for communication center control consoles; six were ordered for installation during 1970.
- Specifications were completed for new solid state battery-operated mobile relays, and 45 replacement and additional units were ordered for installation in 1970.
- Plans were completed and materials ordered to change the district radio nets from frequency actuation to single tone actuation; this project is to be completed before the 1970 fire season.
- Plans were completed for implementing local radio nets in 14 ranger units during 1970.
- Plans were completed to establish a separate Handi-Talkie radio frequency to be used statewide during the 1970 fire season.

Equipment Management and Development

Equipment Management provides vital support for activities of the Division including Fire Control. This function is responsible for developing and testing new equipment; over-all direction of equipment maintenance and repair; and purchase of replacement equipment. The Division's fleet includes about 2,000 pieces of mobile equipment of many different types. About 150 units are replaced each year.

The major equipment development accomplishment of 1969 was progress on a new type firetruck. This unit, known as Model No. 9, is intended eventually to become the standard conventional drive firetruck of the Division. The design includes an extended cab to provide interior seating for all personnel. The most important consideration in this cab design is safety of the crew in case of accident; additional benefits are protection from weather and comfort on long runs.

Model No. 9 is designed to serve as a wildland and structural fire protection unit. Due to its versatility, it should be a useful design for some County Fire Departments and Fire Protection Districts as well as for the Division. During 1969, the Model No. 9 firetruck was reviewed by field fire control personnel and was modified and rebuilt. A full field test of a pilot model is scheduled for the 1970 fire season.

Other equipment development projects during 1969 included:

- A revised standard design for fire camp generator and power supply trailers.
- Testing large, wide, "flotation" type tires on both conventional and four-wheel drive firetrucks.
- Testing fire-resistant blankets for safety use of firetruck personnel.
- A design for a fire camp fuel supply trailer.
- Numerous minor tests including one that resulted in the recommendation that the Division use alkaline batteries in flashlights and radios for increased battery life and economy.

An important aspect of any vehicle management program is training for maintenance and operations personnel. In 1969 the specialized training program for Forestry Equipment Operators, Heavy Equipment Mechanics, and Equipment Maintenance Foremen was continued.

Minimum qualifications for new employees in the Forestry Equipment Operator classification require some basic mechanical background. To assist their in-service training a five-day "cram course" in tuneup is offered at the Fire Academy. Confined to fundamentals of electric systems and carburetion of gasoline-powered equipment, the course is commensurate with Forestry Equipment Operator apprentice mechanic's duties.

The annual five-day training course for Equipment Maintenance Foreman was given at the Fire Academy in February. Thirty-five Equipment Maintenance Foremen and Heavy Equipment Mechanics attended, as well as several retired members of the maintenance organization. Classes were taught exclusively by

manufacturer's representatives from all areas of industry.

Throughout the year, equipment management and maintenance personnel

continued to place strong emphasis and effort on training drivers who operate and maintain vehicles on a day-to-day basis.

RESEARCH AND DEVELOPMENT

Research and development have a significant role in the Division of Forestry program. Research provides fundamental knowledge necessary for understanding complex problems in forest protection, fire prevention, and wildland resource management. Development of equipment and techniques provides actual tools for attacking these problems. Their solution gives the Division additional means for carrying out protection responsibilities and meeting management needs due to rapid changes in wildland resource use and widespread awareness of relationships between wildlands and environmental quality.

Cooperative agreements or contracts between the Division and agencies or institutions engaged primarily in research are the principal means of meeting our research needs. A limited amount is in the category of administrative studies or field investigations.

Fire Research

To implement needs for fire research cooperation with many other government and private agencies was continued in 1969. Funds were contracted to the Pacific Southwest Forest and Range Experiment Station of the U. S. Forest Service for projects related to fire climate, fire management systems, and fuelbreaks. Money was also contracted to the University of California School of Forestry and Conservation for a special study on economics of fire protection. In addition, Division personnel conducted several applied research studies independently, and developed or evaluated several kinds of equipment designed to assist fire control personnel.

The Fuelbreak Project continued its search for methods of effectively controlling hard-to-kill plant species such as scrub oak. Time of cutting together with time, type, and number of herbicide applications are important, but variations in results make it difficult to predict

which treatment will be best on any given date. Creeping sage (*Salvia sonomensis*)- low-growing ground cover native to California-demonstrated promise for planting on sites cleared of brush. Survival from both transplanted wildings and rooted stem cuttings planted during the past three years on the North Mountain Experimental Area in Riverside County has been 75 percent or more. Three year-old plants had crown spread of 60 to 72 inches; while not eliminating other vegetation, they reduced size and frequency of other herbaceous plants. The plant is unattractive to wildlife, another advantage in using it on fuelbreaks. Establishment by direct seeding has been difficult because of poor germination due to an inhibitor in the seed coat; work is being done with various chemicals in an attempt to break this natural seed dormancy. Further burning tests were conducted in 1969 to compare flammability of creeping sage and adjacent native grasses. In a total of 47 plots burned in 1968 and 1969, fire spread an average of 4.8 times slower in creeping sage than in adjacent grass.

The Fireclimate Project continued several studies designed to provide information to assist fire control administrators in relating meteorological observations to solution of fire control problems. These studies included relationship of air stability to fire behavior; nature of Santa Ana winds in southern California; depth of the marine-continental air interaction zone along the south slope of the San Bernardino Mountains; and variations in the Pacific Coast monsoon air flow and its relationship to sea breeze and large scale synoptic air flow. One member of the Project has adopted development of criteria for determining optimum number and location of weather stations for proper sampling of fire weather as a subject for his doctoral thesis. Related to this doctoral study is work of the Division's fire meteorologist who has been

studying what fire weather data should be gathered, and at how many locations on lower slopes of the Sierra Nevada to provide meaningful information to fire control administrators; he also has been working with a private instrument company to perfect fire weather sensing elements for use in automated weather recording stations which can be located at remote and proper weather sampling points.

The Fire Management Systems Project has aimed most of its studies toward solving the problem of preventing or controlling those few large fires which account for most of the annual fire damage during periods when weather or fuel conditions are critical. Three principal problem areas are development of new fire planning methods, computerized fire information systems, and more effective firefighting tactics for potentially disastrous fires. Much emphasis has been placed on determining how various quantitative techniques developed for other systems analysis programs can be adapted to fire control planning and operating needs. Work is proceeding on establishing measurable performance standards, fire information systems, strategy goals, and fire control systems. A study of expected work output for hand crews constructing fire line in various vegetative types was completed. Progress was made in developing a computer model that will predict and map the fire perimeter. Models were also developed for allocating fire control forces, given a specified set of line construction goals, resource, and other values, and available fire control forces. Through cooperative effort a prototype bulk-dry retardant trailer was developed for transporting and mixing fire retardant slurry for ground and air application. Several improvements were made in effective use of helicopters in fire control operation.

The Economics of Fire Protection Project, contracted to the University of California School of Forestry and Conservation worked toward completion of its mathematical model of managing air tanker operations--expected in June 1970. The model will include possibility of integrating inputs of other fire control tools in the future.

The portable video equipment purchased by the Division in 1968 was evaluated during the 1969 fire season. For providing fire intelligence the equipment was found to be most valuable on large fires and in multiple fire situations where the fire boss could not readily or personally survey the entire situation from a single vantage

point and had to depend upon information brought to him by one means or another. Video information was most useful when supplied continuously to the fire boss with a minimum time lag; this meant that one man was in the air recording fire activity almost continuously while a second man was showing the video tapes to the fire boss and his staff on the ground. At designated times and places, video tapes were dropped using foam rubber containers to which brightly colored streamers were attached. Transmitting video information directly from the air to a viewing monitor on the ground is preferable and technically feasible; the high cost of the required equipment has prevented taking this route. Fire behavior information recorded on video tape during 1969 will be studied to determine the possibility of obtaining fire spread data by this method.

Fire Prevention Research

Objectives of Fire Prevention Research are to determine knowledge, attitudes, and behavioral patterns of people as related to prevention of forest fires; to determine how these characteristics can be changed favorably and most effectively; and to identify the characteristics of fire setters.

During 1969 Fire Prevention Research provided the Division with considerable new information to help carry out more effective Fire Prevention action. This information was distributed to field units in the form of California Fire Prevention Notes and Forest Service Research publications.

Research on child-caused fires established additional methods and processes which will provide Division employees with tools to help reduce this particular fire problem. Testing Conservation Education materials in kindergarten through third grade was completed in the Chico schools. Experimental groups showed a significant knowledge gain compared to control groups. Gains were most marked for kindergarten and first grade levels.

The Headstart Research project in Riverside County (1500 pre-school children) was completed. This research dealt with development of fire prevention materials systematically arranged in the form of a teacher's kit, designed to reach pre-school and early elementary children with a fire prevention message. Preliminary research indicated the

project was successful. In fact, an overwhelming response was received by nearly every teacher who had an opportunity to use the Fire Prevention kit. Late in 1969 the activity was made operational in District I. If financing is available, it will be extended throughout California schools. The cost to provide 25% of all kindergarten teachers with a packet will be approximately \$12,000. This project demonstrated that children of this age do show a gain in knowledge when proper teaching methods and fire prevention materials are used.

A two-year study of recidivist children (children who deliberately set more than one fire in violation of law) in comparison to "normal" children was also brought to an end. Recidivist children were generally found to come from disrupted families with parents of low education, income, and standard of living. Absence of the father from the family, or non-communication with the father was a common characteristic. A report of this project entitled "Children Who Set Fires," was distributed to the field units and cooperating agencies.

A report was also published on the new evaluation of the Fire Hazard Inspection procedures in Butte County. A comparison was made between residents of Butte County and residents of Utah County, Utah, in regard to fire prevention knowledge and attitudes. Personal contact was again found most effective in conveying a fire prevention message.

Use of Conservation Education materials and methods was tested by means of educational television in the Chico area. This method proved extremely effective. Children responded enthusiastically to this fire prevention approach. Teachers felt this approach for teaching fire prevention would provide considerable knowledge of the subject to young children. Efforts will be made to use educational television operationally on a limited basis during late 1970 or early 1971. The cost will be approximately \$1,000 for twenty 20-minute television programs.

Research of effective television spots was continued. However, television spots shown on commercial channels produced too few responses for meaningful analysis. The spots will be tested further with captive audiences.

A cooperative study was started to determine feasibility of using radioactive trace elements to identify incendiary devices and flammable liquids used by incendiaries.

Inventory of Wildland Soil and Vegetation

An inventory of wildland soils and vegetation is being carried out cooperatively with the Pacific Southwest Forest and Range Experiment Station and the University of California.



Field scientist tests the pH of one of the soils of woodland-grass vegetation in Tuolumne County. Thirty-one soil profiles were described and sampled in mapping 132,000 acres during 1969.

During 1968, field mapping of 132,000 acres was completed; this acreage includes continuing work in the Butte, Plumas, Calaveras, and Tuolumne county mapping units. Thirty-one soil profile samples were collected and described by field scientists; laboratory chemical and physical analyses of 144 horizons from 32 soil profiles were completed. In continuing grassland studies 27 plots were sampled and 65 plant specimens were collected. Rangeland fertility trials were continued in the mapping units.

Other Research

In addition to studies and demonstrations conducted by the Division—particularly in

reforestation on State Forests, and in brush range improvement--more formal research in forest and watershed management was conducted in cooperation with the U. S. Forest Service and the University of California. This effort was at about the same level as in 1968.

Assistance to the San Dimas Experimental Forest in Los Angeles County continued for the twenty-second year. No funds were provided, but 4,000 man-days of labor from the Prado Conservation Camp were used in studies on emergency revegetation and slope stabilization on burned brush watersheds.

Grants totaling \$44,888 were made to the University of California to continue four

contract projects--planting stock physiology, forest rodent control, bark beetles, and dwarfmistletoe. Laboratory studies on Douglas-fir seedlings in a controlled environment were extended, and field observations were made on effects of fall temperatures at the nursery on root regeneration potential of the species. Various rodenticides were tested, including field trials of diphacinone. A synthetic sex attractant was developed and testing commenced for the western pine beetle, one of the major tree killers in California. The last project continued investigation of the many aspects involved in the spread of dwarfmistletoe in true fir stands.

FOREST, RANGE, and WATERSHED MANAGEMENT

The forest, range, and watershed management activity was developed to assist and encourage management and improvement of the resources of California's vast extent of wildlands. The activity includes assistance and encouragement to landowners, regulation of timber harvesting on private lands, and demonstrations of good wildland management practices in maintaining their productivity and enhancing the quality of the environment. Administrative studies and practical field tests and investigations provide additional knowledge for attaining established objectives.

State Forests

The State Board of Forestry in 1968 recognized the Division of Forestry should not be engaged primarily in maintaining campgrounds or attendant facilities, but such operations are necessary and incidental to protection and management of State Forests. Since people camp on State Forests and use them for recreation in other ways, the use creates fire, safety, and health hazards that can be controlled only by appropriate regulations. To cope with increasing problems of people using State Forests for varied recreational activities, in April 1969 the Board of Forestry adopted administrative regulations prepared for preservation, protection, and use of State

Forests, and for promotion and protection of public health and safety within the forests.

Application for the 250-acre Pygmy Forest Reserve on Jackson State Forest as a registered Natural Landmark has been submitted to National Park Service. Registration will give national recognition to this unique vegetation and soil type. Approval is expected in 1970.

White pine blister rust control work on Mountain Home State Forest continued through 1969. Trees on about 720 acres where the rust is prevalent were marked and treated. All areas treated in 1968 were checked and retreated as needed in 1969. In conjunction with the control work other pruning and thinning stand improvement was done. Over 9,600 sugar pines were pruned, and 21,800 trees of all species were cut to improve spacing of crop trees. Some 900 trees found to be infected with blister rust were removed. Most of the streambanks in the forest were scouted and treated. Many small infection centers were found. Most cankers originated in early 1960 and no older infections were found.

Porcupine damage to ponderosa pine appears to be increasing in Boggs Mountain State Forest. Control work should start in the spring of 1970.

Inventory and growth information required for sound management practices continued to be collected. A continuous forest inventory for Mountain Home State Forest was developed and

the initial field work started. Approximately one-third of the inventory plots on Latour State Forest were remeasured. The first remeasurement of all plots is expected to be completed soon. Field work for Jackson State Forest's second remeasurement has been completed. Volume and growth information from these continuous forest inventories will become an essential part of the management plan of the individual forest to help up-date goals for the next decade. Computation procedures for the unique variable plot inventory system developed for Latour State Forest were published in 1969 and are available to timberland managers and others.

A cooperative study with the University of California to develop young growth *Sequoia gigantea* volume tables was started. During 1969, over 200 Sierra redwoods were measured with a dendrometer furnished by U. C. The dendrometer can make diameter measurements at various heights on standing trees and these data are then computed for volume tables. This information is needed for the continuous forest inventory on Mountain Home State Forest. Currently such information is not available.

Dogwood and associated hardwoods occupying good timber soil on 20 acres at Boggs Mountain State Forest were sprayed at the base of their stems with various herbicides to control competing vegetation and release established small conifers. The work in 1968 showed very high mortality of hardwoods while results in 1969 were very erratic. Another pilot study was initiated to test methods and feasibility of controlling manzanita by applying herbicides to the foliage. These studies are being conducted with the aid of the range improvement specialists and may have wide application in forest management, fuel break maintenance, and brush land conversions.

Preliminary results of test on Boggs Mountain State Forest indicate a growth response of ponderosa pine to heavy applications of ureanitrogen fertilizer. Eleven pairs of saplings and poles were selected; after one season fertilized trees responded by accelerated growth rates of 3 to 6 percent over non-fertilized trees.

State Forest Note No. 38, "Operational Aspects of Chemical Stump Treatment for *Fomes annosus* Protection on Boggs Mountain State Forest," was published in 1969. Jackson State Forest personnel spoke to the Redwood Region Logging Conference and conducted tours

of the forest and the Pygmy Forest Reserve for students, professors, and international botanists. Tours for college students interested in forestry as a profession were conducted on Jackson and Mountain Home State Forests.

Timber sale activity continued at a high level, with over 39.9 million board feet of timber harvested, plus 4,249 Christmas trees and other miscellaneous forest products. Revenue of \$1,755,664 was received from sale of these managed renewable resources. The 75 percent increase in revenue over 1968 was due largely to the rising lumber market that peaked in the second quarter of 1969. Almost 10.5 million pounds of eucalyptus were sold during 1969. This was the first time any State Forest timber was sold by the pound without converting it to board feet. Over 21 million board feet of timber was sold using the board foot-to-pound ratio method which involved weighing all truck loads of logs and scaling some sample loads.

A classic sanitation-salvage sale was conducted on Boggs Mountain State Forest during 1969 to utilize merchantable material and to improve the health and vigor of the forest. Less than 800 board feet per acre were removed from 600 acres with only decadent and high risk trees being harvested.



High speed mobile equipment used to log low volumes per acre on Boggs Mountain State Forest timber sale.

The State paid \$73,377 to counties for 1968-69 in-lieu taxes on State Forest properties; a total of \$689,116 has been paid for this purpose since the forests were acquired. The

1968-69 taxes to the counties from State Forests increased 46.5 percent over the 1967-68 tax year. In 1969, Jackson State Forest was zoned as agricultural-forest lands, which will qualify this forest for a reduced tax rate.

Besides being used for demonstrational and experimental work, and the timber and water they produce, State Forests are valuable for food and shelter they furnish fish and wildlife. Hunting and fishing are major attractions. Over three-quarter million salmon eggs were taken from streams within State Forests for rearing in state hatcheries for future release in other streams. In 1969, recreational uses amounted to some 57,000 visitor-days, and over 41,000 camper-days. The 70,398 acres of State Forest lands provide the public a forest environment for a wide variety of open space activities.

Forest Practice Act

Great strides were made in enforcement of the Forest Practice Act and Forest Practice Rules in 1969. There was more real accomplishment in acting on violations, getting corrections completed, and new correction started on substantial violations than in any previous year. The first correction of violations by the state under Public Resources Code Sections 4615-18 was begun in 1967, and brought to a successful conclusion in 1969, with the timber operator paying for the correction cost.

At the request of the Legislature, the Board of Forestry conducted a study of possible methods of collecting enough fees from timber operators to offset total costs of administration of the Forest Practice Act. After holding a public hearing and investigating several methods, the Board concluded that it would not be good public policy to collect fees sufficient to cover all the costs, nor would it be equitable or practical to do so.

Local pressures for stricter control of logging operations intensified in Marin, San Mateo, and Santa Cruz counties. By public demand these counties are attempting to control logging activities through use permits, local ordinances, or other means. A few legal actions were begun in 1969 to determine how far local government can go in regulating logging. The results and full impact of these actions are not yet known, but where forests are near urban

areas the public is clamoring for a higher level of forest practices for stream protection, erosion control, fire protection, hazard reduction, and aesthetic reasons. The Redwood District Forest Practices Committee and the Board of Forestry are investigating the matter.

The Forest Practice Committee held five meetings and three field trips to review and consider alternate plans. Governor Reagan appointed J. W. Timmons, representing private timber ownership, to the Redwood Forest Practice Committee to replace Bernard Agrons who resigned because of change of residence to another state.

In 1969 the State Forester issued 359 new timber operator permits, and renewed 971 permits, collecting \$16,285 in license fees. There were 87 more timber operators in 1969 than in 1968. Some 2,175 notices of timber operations were filed in 1969, showing intended operations covering 2,232,403 acres.

Some 1,243 timber operators in 1969 reported cutting 5.34 billion feet in 1968—about 0.28 billion board feet more than in 1967. Of these, 927 operators cut saw and veneer logs; some cut other miscellaneous forest products in addition; 273 operators cut Christmas trees; and 43 others miscellaneous forest products, such as greenery, fuelwood, and split products.

In 1969 the Division made 2,274 forest practice inspections. Statewide, 93 percent of all rules inspected for were in compliance, compared with 94 percent in 1968. Over-all compliance with rules in both the Redwood Forest District and the Coast Range Pine and Fir Forest District was 93 percent. There was 96 percent compliance in the South Sierra Pine Forest District, and 94 percent in the North Sierra Pine Forest District. Inspectors observed 1,012 infractions of rules in 1969; 828 were observed in 1968. Forest Practice Rules most often found in violation were snag disposal, fire plan filing, erosion control, firebreaks for slash areas, slash disposal, and fire rule posting—in that order.

The Division carried out most law enforcement administratively, sending out 832 Notices of Violation for infraction of Forest Practice Rules. Division personnel sent many letters and held follow-up meetings with operators to improve compliance with the rules.

Notice of Intent of the State Forester to deny permits or take action to correct forest practice violations resulted in operators completing correction of violations in 18 cases,

and the state completing corrections in one case for a total of 19 cases with corrections completed in 1969. One case was closed by expiration of the statute of limitations; two cases were investigated and found to be in compliance with no need for further action. Eight other cases have corrective action continuing or stipulated. Thirteen new cases were initiated, with legal action in various stages; and one case is before the Board of Forestry for hearing on corrective action. In summary in 1969, 22 cases were concluded and 22 more are in various stages of corrective action or legal development, for a total of 44 handled, compared with 28 in 1968.

Revision of the Forest Practice Rule exempting timber operations from certain cutting requirements, if land is no longer to be used for growing timber, was reasonably effective in reducing both applications for conversion from timber and acreage in 1969. The State Forester issued certificates to 53 timberland owners for conversion of 16,197 acres from timber growing; 75 owners filed for conversion of 24,740 acres in 1968.

The Board of Forestry approved 43 alternate plans in 1969. Thirty-three were in the Redwood Forest District and 6 in the Coast Range Pine and Fir Forest District, all for restocking cutover areas by seeding or planting trees in lieu of leaving seed trees or adequate stocking. Four plans in the North Sierra Forest District were for cutting small trees, thinning for stand improvement, and for Christmas tree management.

Forest Pest Control

Protection of California timberlands from forest pests (insects, animals, and diseases) requires an intensive cooperative effort by the Division, private land owners, and federal government. To meet this responsibility the Division is concerned with detection, appraisal, and control of forest pest damage.

Losses from forest insect activity in 1969 was at their lowest level in ten years. The pine leaf scale outbreak reported last year at South Lake Tahoe has increased in size and intensity. Direct control action was not recommended for this infestation. Bark beetle activity has been detected in some weakened trees infested by the scale. A cooperative project with the U. S. Forest Service has established plots to keep

abreast of the activity of the Douglas-fir tussock moth.

Heavy precipitation during the winter of 1968-69 created favorable conditions for increased activity for needle and foliage diseases. Five new needle diseases were reported for the first time. New root rot centers continue to be reported. There were new white pine blister rust infection centers found and some old centers intensified and spread. However, no further southward spread of this disease was detected. The red band needle blight attacking Monterey pine plantations on the north coast has nearly wiped out two plantations. However, the plantation at Jackson State Forest appears to be combating the disease.

Deer browsing continues to cause serious damage to young trees on the north coast and along the northern tier of counties. Porcupine damage is on the increase: reports of this damage has been received from Lake County in the west and Inyo County in the east.

Ten projects for controlling bark beetles, treated 1,961 trees during the year. Blister rust control, in cooperation with the U. S. Forest Service and private landowners, covered 3,979 acres. A blister rust control project on Mountain Home State Forest (Tulare County) involved 720 acres where 900 infected trees were treated.

The Division, in cooperation with the U. S. Forest Service, conducted an aerial forest pest detection survey of timbered areas of the state.

Forestry Advisory Services

There are about 30,000 owners of small forest properties in California embracing 3½ million acres of timberland. It is vital to the state that these lands be managed and protected for forest production and to enhance the environment. Management of forest property requires professional skill which most owners of small forest lands do not possess. The owners need specific advice and assistance regarding their property to develop and improve these lands to their full potential. Wise management of these lands is also needed for preventing erosion, protecting aesthetic values, and providing recreation and wildlife habitat. Benefits from these lands can be impaired by lack of knowledge and improper land use or management.

Ten forest advisors, located strategically throughout the state advise owners about forest

protection, reforestation, harvesting, and marketing forest products; recreational use of their properties; and related activities.

Higher stumpage prices prevailed in the early part of 1969, increasing harvesting activities on many small ownerships. However, during the latter half of the year, stumpage prices dropped abruptly. Total value of forest products involved jumped from \$1,337,00 in 1968 to \$3,344,000 in 1969. Many land owners are given counsel about recreation, special forest products, water, and wildlife.

The fragmentation of large tracts into smaller recreation and summer home subdivisions continues at a rapid rate. Many owners, when logging their properties, want it done carefully and controlled.

Forest advisors are providing considerable assistance to teachers who are required to provide instruction in elementary schools about resource conservation. They also provide some assistance to high school and college instructors.

Increasingly forest advisors in metropolitan areas are becoming involved in urban forestry. Examples are smog damage to Christmas trees under power lines in the heart of Los Angeles, and development of recreational potential for rural areas in Los Angeles County. In San Mateo County a forest advisor acted as liaison with a county coordinator between local residents near logging operations. The local residents opposed the logging. The forest advisor helped work out possible solutions acceptable to all parties.

Foresters also act as technical advisors for forestry practices in the Agricultural Conservation Program. These practices involve forest tree planting, seeding, and thinning forest stands to increase production.

During 1969, forest advisors received 2,845 requests, and assistance was given to 2,480 owners of 350,000 acres of timberland. Forest product harvesting took place on 16,315 acres. Timber stand improvement work was accomplished on 3,528 acres, and 5,440 acres were planted or seeded. Some 148 forest products operators were assisted and 260 referrals were made to consulting or industrial foresters, because of size, time available, or complexity of owner's forest problems.

The Division in 1969 became a technical advisor for a Resource Conservation Development project in Modoc County to develop new markets for forest products in the area. Juniper logs were shipped to Japan to explore the possibility for developing markets

for this species. Field work for a survey of production of forest industries in California was completed in 1969. The results of this federal-state cooperative project will be published in 1970.

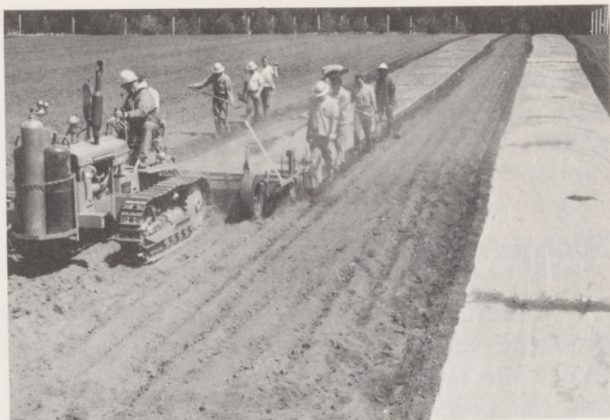
Nurseries and Reforestation

Forest trees in the mountains of California produced very limited, scattered cone crops for seed collection in September and October. It was the poorest production since the Division has been collecting and processing cones. Only 149 burlap sacks of cones were collected by Conservation Camp inmate crews. These cones yielded 290 pounds of seeds, considerably less than one-tenth of an average annual yield. Fortunately a backlog of approximately 20,000 pounds in storage at the Division's three nurseries will provide sufficient for nursery needs in 1970.

The three nurseries--Davis Headquarters, Yolo County; Magalia, Butte County; and Ben Lomond, Santa Cruz County--produced 3,167,000 seedlings during the 1968-69 planting season. In addition, 414,600 seedlings were purchased from U. S. Forest Service nurseries to meet increased demands. The 3,581,000 total was next to the highest number of seedlings distributed since the nursery program was expanded in 1950. Also, the 1,458 orders processed was nearly 200 more than the previous year, and a record for any year.

The Advisory Committee to the State Forester on Reforestation Methods and Procedures met twice during the year. The 10-member Committee is appointed by the State Forester by authority of Section 4694, Public Resources Code. The Committee advises the Division in reforestation studies and suggests means for improving reforestation. It has been meeting twice a year since it was organized in 1958.

In July the Committee met in the northwestern part of California to review successes in Douglas-fir regeneration. Most planting in that area has been done by the U. S. Forest Service. Problems causing high mortality in earlier years have been largely overcome. Better site preparation and better conditioned stock are obvious factors contributing to improvement. Clear-cut areas, being successfully regenerated both naturally and by artificial methods, were observed on the tour.



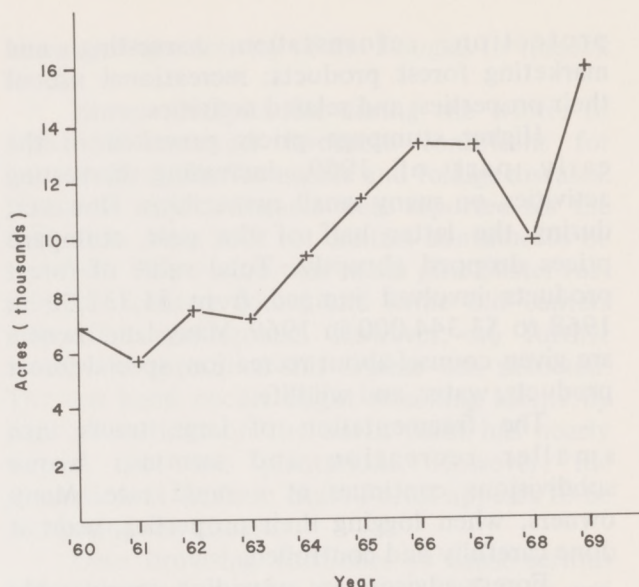
Production of planting stock in forest nurseries requires several complex operations, even before seed can be planted. One operation is soil fumigation to kill weed seeds and soil-borne fungi harmful to tree seedlings. At Ben Lomond Nursery a tractor pulls an attachment that injects fumigant and lays a polyethylene tarp to hold it in the soil. The nursery's Youth Conservation Camp crew follows to cover tarp edges that the tractor may have missed.

The Committee passed a resolution suggesting the State Forester request University of California Extension Service to conduct a field school devoted to tree improvement (genetically improving forest trees for better production). One objective of the school will be to stimulate interest of landowners in increasing forest productivity by adopting tree improvement management techniques.

In December the Committee held a meeting at Davis Headquarters Nursery in Yolo County. Members reviewed nursery operations, including seed processing and container propagation of tree seedlings.

During the December meeting two retiring charter members, University of California School of Forestry and Conservation Professor Emeritus Emanuel Fritz and Mr. Ralph Van Wagner of Los Angeles County were honored with certificates of appreciation from the State Forester and the Committee.

There was an encouraging upturn in the state's total reforestation accomplishments: 16,090 acres were reforested, a considerable increase over the 10,231 acres in 1968. Most of this increase was a result of direct seeding which increased from 5,468 acres to 11,536 acres. Planting seedlings, however, decreased slightly—from 4,763 acres to 4,554 acres. Most of the seeding was done aerially to regenerate logged areas, of which 10,626 acres were on forest industry land.



Ten years of total California reforestation accomplishments on private land. (Includes seeding and planting.)

Numerous reforestation studies were conducted by Division personnel in cooperation with private landowners. They included site preparation methods for reforestation in dense mountain misery ground cover, and investigations in natural red fir seedling establishment. Also investigated were factors affecting germination and growth of pine and fir seedlings from artificial seeding.



Hand pollinating selected parent trees is a step in improving growth and form of future forests. This "select" ponderosa pine required 40 feet of special ladder just to reach the live crown. The flowers to be pollinated were still another 50 feet or more above.

Several tree improvement studies were continued. To test the amount of growth gain in offspring from artificially crossed ponderosa pine parents, four select mother trees in Nevada County were climbed, bagged, and pollinated with pollen from select parents in Santa Cruz and El Dorado Counties. Offspring from other ponderosa pine crosses and two between-species crosses of knobcone X Monterey and Jeffrey X Jeffrey X Coulter pines were planted in the field to test survival and growth.

Timber Taxation

Section 12 3/4, Article XIII, of the State Constitution exempts timber remaining after cutting from taxation for 40 years or more under certain conditions. A Timber Maturity Board, consisting of a representative from the State Board of Equalization, the State Board of Forestry, and the Assessor of the County in which the timber is located must then declare the exempt timber "mature" before it can be returned to the county tax roll. The Division has responsibilities for record keeping, participating in field examinations, and assisting the Board of Forestry member of the Maturity Board in connection with maturity declarations under this Section.

As soon as 40 years have passed after cutting trees in exempt timber stands must be compared in quality and size to timber generally being harvested in the area. If comparable, the Maturity Board must declare such stands mature for return to the tax roll.

In 1969 Maturity Boards convened and declared 4,369 acres of timber mature on 9 properties in Tuolumne and Humboldt counties. Some additional field work was done in Tuolumne County.

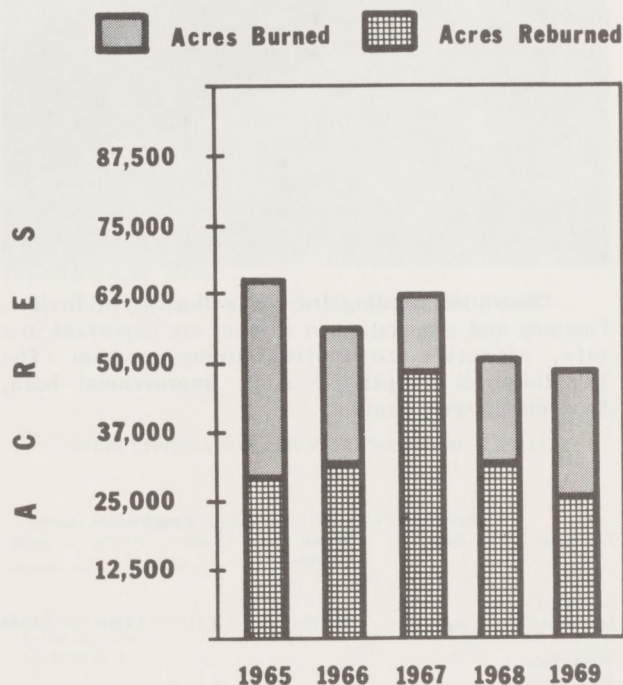
In 1969 the export log market and consequent local competition continued on from 1968 to stimulate utilization of smaller, lower quality trees from young growth stands, especially in Humboldt County. Movement of smaller, lower quality logs seemed to be leveling off, or slowing in late summer and fall of 1969.

Brush Range Improvement

Ranchers and sportsmen used fire as a tool in clearing 48,490 acres of brush-covered land in California during 1969. One hundred and ninety-five applications were received, which proposed burning 118,893 acres of brush range

land for both range livestock and wildlife habitat improvement. Permits, with recommendations regarding safe use of fire were issued to 141 individuals. These permittees conducted 120 separate controlled burns, 13 of which were cooperative projects involving two or more adjacent landowners. Division of Forestry fire control forces stood by in event a fire escaped during burning of 32,729 acres on 40 separate burning projects. Thirty-two permit burns were reportedly made for game habitat improvement exclusively, and 13 others for both domestic livestock and wildlife management, with much of this activity in the North Coast District.

Activity in the controlled burning program dipped slightly again this year, with a decline in both number of burns conducted and total acres burned. Several proposed burns were deferred due to unfavorable or adverse burning conditions during the regular season. Since 1945, about 1.88 million acres of unwanted vegetation have been treated by fire in California, and an additional 714,932 acres have been treated under repeated burning projects to maintain a desirable forage cover.



The burning activity in brush range improvement dipped slightly again in 1969. A little more than 53 percent of the total acres treated was reburned to maintain a good forage cover.

To a much greater extent, fires are becoming just one phase rather than the entire treatment in the process of converting

unproductive brushland to improved rangeland. Division specialists advised landowners of other treatment-- mechanical preparation, seeding, and spraying--used in combination with burning. In 1969, 25,797 acres of brush were re-burned; 7,959 acres were treated mechanically or sprayed with herbicides prior to burning; and 10,816 acres were seeded with mixtures of forage grasses and legumes.

The California brush range improvement program has as its objectives fire prevention and protection, watershed protection and conservation, and improvement of forage production on brush-covered lands. To this end, range improvement projects are conducted for field studies and demonstrations. Three major and several lesser experimental projects are currently in progress as cooperative studies with other agricultural agencies and private landowners.



Controlled burning from a well-prepared fireline. Planning and preparation in advance are important in a safe, effective controlled-burning program. The Donati-Cooper cooperative range improvement burn, San Luis Obispo County.

TABLE 1. EMERGENCY REVEGETATION ACTIVITY IN 1969

Fire Name	Date	Total Burned (Acres)	Land Seeded (Acres)		
			Public	Private	Total
San Mateo San Diego Co.	Aug. 22	16,379	9,335	1,420	10,755
Walker Basin San Diego & Riverside Co.	Aug. 22	19,400	*3,410	6,576	9,996
Moosa Canyon San Diego Co.	Aug. 22	6,342	—	4,691	4,691
Weldon, Los Angeles Co.	Oct. 29	4,010	—	3,810	3,810
Valle Vista Riverside Co.	Nov. 28	342	150	—	150
Total		46,473	*12,895	16,507	29,402

*Includes 2,580 acres of state-owned land.

Emergency Revegetation

The Cooperative Emergency Revegetation Program provides for emergency seeding of burned-over watershed lands to reduce soil erosion, flooding, and downstream sedimentation detrimental to public health and welfare.

During the 1969 fire season, five major fires that burned in southern California brush-covered watersheds required emergency treatment. The five fires burned 46,473 acres of public and private land. Field examinations determined that 29,402 acres needed seeding. A total of 16,507 acres of private land, and 12,895 acres of public land, including 2,580 acres of state-owned lands, were seeded under the state's cooperative emergency revegetation program (table).



Seeding the Walker Basin Burn, one of three emergency revegetation projects following major fires in San Diego County on August 22, 1969. Wimmera ryegrass was sown on 9,996 acres of this burn at the rate of 8 pounds per acre.

Range and watershed specialists of the Division of Forestry directed seeding of 25,592 acres of watershed burned in four fires in San Diego and Riverside counties. Seeding was by fixed wing aircraft, sowing common annual ryegrass (*Lolium multiflorum*) or wimmera ryegrass (*Lolium subulatum*) at the rate of eight pounds per acre; the cost average \$1.47 per acre. In addition, the Los Angeles County Fire Department directed seeding of 3,810 acres from one major fire that burned in Los Angeles County.

FIRE PREVENTION

The objective of the fire prevention element is to reduce the rate of man-caused uncontrolled fires; and ultimately to achieve an acceptable level of fire occurrence by influencing public attitudes and behavior.

- The long range goal is to reduce man-caused fire occurrence from about 28 preventable wild fires (all fires, Zones 1 & 2, State Responsibility Areas of direct protection) per 100,000 population to about 10 on a statewide basis. Ability to achieve this standard has been demonstrated on the Butte Project and indicated by research.
- The goal for the present (1970) is to maintain the status quo of man-caused fire incidence relative to the population risk; that is, 28 wild fires per 100,000 people (assuming no change in level of funding).

Fire Prevention Activities

The table immediately below shows inventoried fire prevention workload of the

WORKLOAD INVENTORY AND ACCOMPLISHMENTS IN FIRE PREVENTION: 1969

ITEM	NUMBER (Miles)	TREATED (Miles)
Roadsides	27,218	8,715
Railroads	1,301	849
Power lines	22,795	17,613
	NUMBER	INSPECTIONS
Dumps	1,062	1,427
Structures and Premises	279,139	57,621
Recreational Areas	5,708	5,292
Forest Products, Mills and Operations	2,324	1,434
Industrial Operations		
(incl. Agricultural)	4,281	2,193
Mechanical Equipment	56,705	11,298
Burning Permits Issued	58,956	20,259
Project Permits Issued	553	559
	NUMBER	ARTICLES; PROGRAMS
Press, T. V., Radio, Theater	1,162	14,625
Schools	3,147	4,985
Clubs, Groups, Associations	6,466	2,423
Commercial	838	8
Exhibits-Outlets (Fairs, parades)	331	194
Recreational Areas (organized)	1,371	89
	NUMBER	
Fire Prevention Material Distributed		
California Division of Forestry	3,321,645	
Cooperators	5,549,239	
Fire Prevention Public Contacts	742,852	
Movie Trailer and Television Spots		
Distributed	770	
Fire Prevention Committee Members	440	
Fire Cause Investigations	6,721	
Enforcement Cases		
Misdemeanors (prosecutions completed)	315	
Felony (prosecutions completed)	25	
Civil Cost Collection Cases (closed)	285	
Research Projects	8	
Employees Given Training	228	

Division. It also shows miles of right-of-way fire proofed, fire prevention and fire-safe inspections made, news items written and programs given, materials distributed, fire law case load, number of research projects (reported on in detail elsewhere), and employees trained. This table is immediately followed by fire statistics.

A comparison of these output data with the inventoried workload (including fire load) indicates that less than 1/3 of the needed inspections and other fire prevention work is being accomplished.

In CDF responsibility areas (Zones 1 & 2) of direct protection, lightning fire incidence more than doubled this five-year average and was 14% of all forest-type fires. Of the man-caused forest-type fires last year more than 60% were again caused by incendiary, children, and machine-use agents. Smoker and debris burning fires continued to decrease.

All fires in Division of Forestry Zones 1 & 2 continue to increase to more than 300 per year on a trend basis.

Statewide all forest fire protection agencies experienced a slight decrease in forest-type fires (less than 1%). Acreage burned was down 50%.

The trend of E and larger fires (over 300 acres) started upward after many years in a downward direction. This appears largely due to increased incidence of all fires and specifically machine-use fires.

The tables below illustrate these points:

WILDFIRE INCIDENCE (CDF DIRECT PROTECTION)

	1969	1968	5-Year Average
State Responsibility (Zone 1 & 2)			
Forest-type Fires	4,414	4,434	3,833
Confined Fires	2,902	2,710	2,534
County Responsibility (Zone 3)			
All (ground vegetation & confined)	9,906	9,985	8,987
Total CDF Controlled	17,222	17,129	15,354
Major Causes (Forest-type Fire, Zone 1 & 2)			
Lightning	595	400	288
Campfire	140	118	89
Smoking	528	590	644
Debris Burning	352	455	409
Incendiary	837	805	691
Machine Use (incl. Railroad, Construction, Logging)	716	712	651
Miscellaneous (incl. child, power line)	1,246	1,344	1,061

Causal Agents and Locations (Forest-Type Fire, Zone 1 & 2)

Occupant	578	699	645
Recreationist or Traveler	866	988	880
Timber Operations	18	18	28
Hunter	104	100	136
Railroad	248	228	262
Power Line	160	128	127
Roadside	536	436	603
Children Caused Fires	765	949	735

All Agency Forest-Type Fires - 1969

	Number	Acres
California Division of Forestry	4,414	78,890
U. S. Forest Service	2,249	19,554
Bureau of Land Management	34	79
National Park Service	194	56
Contract Counties	1,590	19,439
	8,481	118,018

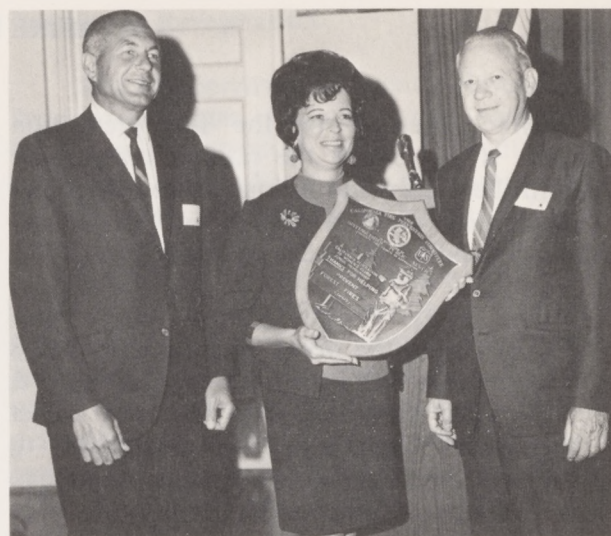
Information and Education

The 450-member California Fire Prevention Committee consists primarily of industrial, public utility, civic, association, and public agency organizations. Thus, membership actually consists of thousands of people who work for or belong to one of these organizations. One such group, the California Federated Women's Clubs, Junior Membership, devotes much time and energy to Fire Prevention and Conservation Education.

In May the Committee's Northern California Annual Award, the Smokey Bear Plaque, for outstanding fire prevention accomplishments was presented to Mrs. Jerry Gardner, of the Junior Women's Clubs, by Bill Hartman of Keep California Green, Inc. The award was made in the Pacific Telephone Company auditorium in San Francisco. Earlier this year Deputy State Forester Melvin Pomponio presented a special fire prevention award to the Menlo-Atherton Junior Women's Club at their State Convention in Sacramento.

Also in May, the southern California Fire Prevention Committee Plaque was presented to Mr. Richard E. France of Standard Oil Company, in the Southern California Edison auditorium in Los Angeles. The award was delivered by Joe DeLucchi of DeLucchi Farms, the 1968 plaque winner.

Joe DeLucchi also presented a Certificate of Appreciation to Los Angeles Police Officer Whitey St. George at the Los Angeles meeting of the Committee, and to Don and Mary Lou Pittman (store owners in Twain Harte) at the San Francisco meeting. State Forester Francis Raymond, also in San Francisco, presented a Certificate to Ray Hunter, Director of Natural Resources, California Farm Bureau Federation. The certificates were for many years of



The Smokey Bear Plaque for outstanding fire prevention accomplishments was presented to Mrs. Jerry Gardner, California Federated Women's Clubs, Junior Membership, by the California Fire Prevention Committee. Regional Forester John Deinema (left) and State Forester Francis Raymond (right).

continuing, high performance in fire prevention.

The California Fire Prevention Committee and Chairman Francis Raymond, greatly appreciate the many courtesies shown the Fire Prevention Committee over the years by the host companies--Pacific Telephone and Southern California Edison--and their very cooperative representatives Len Quever and Maury Croson, respectively.

Command Decision, a 22-minute training film written by Assistant Deputy Len Chatten, based on "Principles of Forest Fire Management," by Clar and Chatten, was produced by the George Fox Company of



Command Decision, a 22-minute Division of Forestry training film was produced in 1969. The movie crew on the set at Charlton Flat, Angeles National Forest, during the filming in February 1969.

Hollywood in 1969. From this film, three television spots and movie trailers were made (20-, 30-, 60-seconds). All participants in the film except one were Division and other agency employees; the instructor's role was played by George Walsh, a professional actor and veteran of CDF fire prevention and training films. Chief Deputy Lewis Moran, as the Ranger narrator, and Ranger Jack Burke, as the Fire Boss, turned in commendable performances.

A special 60-second spot was made by Fire Prevention Officer Walter Bolster with the photographic and sound skills of the Graphic Services Division of the Department of Water Resources. This spot, widely shown by television stations, had Boy Scouts around their campfire at Camp Harvey West (El Dorado County) singing "This Land is Your Land," and ending with a fire prevention message.

Fire scenes shown in this spot and used in *Command Decision* were from the Division's original film library, stored and catalogued by the Department of Water Resources. These films were taken by fire prevention officers and other employees of the Division.

About 20 new film titles were added to the circulating film library and a new catalogue issued. These films were shown 2,315 times -- to 137,911 people -- in 1969.

In May, staff Deputy State Forester Howard Moore, in charge of Fire Prevention, moderated a presentation to the Board of Forestry on fire prevention. Industry and public agency leaders related their plans for aiding the fire prevention program for the 1969 fire season.

In November, Deputies Moore and Hastings, and Ranger Lix presented the State Forester's Fire Protection Plan to the Board of Forestry. The plan was accepted by the Board with some reservations (inadequate time for study by the Board). Its acceptance enabled the State Forester to meet a legislative mandate for an up-dated plan by December 1, 1969. The State Forester will present portions of the plan to the Board for close study during their 1970 meetings. The Fire Protection Plan embraces all phases of fire protection, including prevention.

Before the end of 1970, all Fire Prevention Handbooks should be completed (Information, Education, Engineering, Law Enforcement, and Research).

The Division continued its close working fire prevention relationships with the U. S. Forest Service, the Redwood Region Conservation Council, Keep California Green,

Inc., and many other fire prevention-oriented agencies and groups.

The fire prevention roadside signs -- in use for twenty years -- were discontinued, victims of higher priorities in competition for the budget dollar.

A six-foot animated, fiberglass Smokey Bear was purchased by the State Forester's office in 1969 and will be available for use statewide.

Fire Prevention Engineering

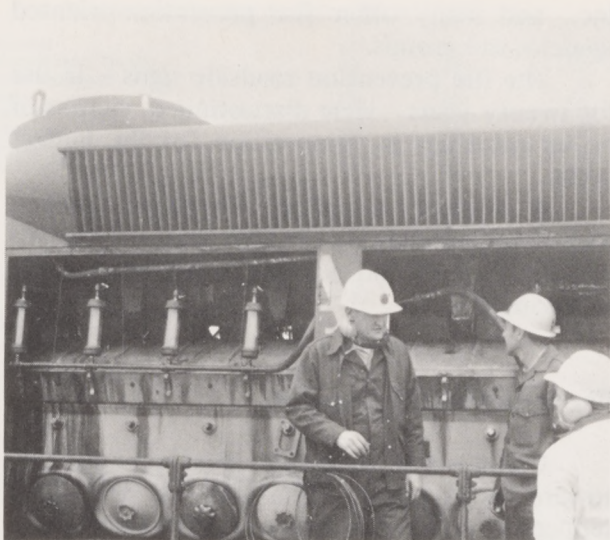
Considerable time and effort were directed toward railroads to eliminate or drastically reduce the number of fires caused by locomotive exhaust, and to increase the quality of right-of-way treatments. The goal is to increase use of chemicals to eliminate all vegetation within 25 feet from each side of the towpath, coupled with a firebreak at the outer limit of the right-of-way.



Western Pacific Railroad spraying chemical to a distance of 35 feet from the towpath at a specific point requested by the Division of Forestry.

A spark arrester for locomotives was designed and built by Division personnel and Southern Pacific Company. The arrester, when tested, proved to be 93 to 98 per cent effective in removing carbon particles larger than .0232 inch in diameter from the exhaust flow, dependent on throttle setting of the engine.

All railroads operating in California were notified that on July 1, 1970, non-turbocharged locomotives would have to be equipped with an approved spark arrester. Pending enlargement of



A carbon injection system is used to test efficiency of locomotive spark arresters (one-half of system shown in photo). A measured amount of test carbon is fed into the arrester during a specified period; a positive trap on the arrester outlet measures all carbon not retained or pulverized.

the U. S. Forest Service facility at San Dimas, the Division will test arresters, when necessary and requested to do so by a railroad or arrester manufacturer. (California Public Resources Code, Section 4442, enacted in 1963, requires arresters to remove and retain all particles over .0232 inch.)

Tests of some electrical hardware and equipment used in distribution circuits were completed. As a result of these tests and fire history, Administrative Regulations requiring clearances around certain electric poles and towers are being changed. As an example, tests have shown the self-protected transformer (CP) does not start forest fires as does the older conventional type because of built-in fusing and a secondary circuit breaker. Thus, firebreak clearance will not be required around poles holding CP transformers provided all other regulations are met.

The San Diego Gas and Electric Company, working in cooperation with the Division, has instituted planned procedures for fire prevention. The procedures are put into effect on the basis of the Wildland Fire Danger Rating as reported to the company from the local Ranger Unit headquarters. The procedures include not testing circuits (no circuit shall be energized after a fault until the fault is found and repairs made); restrictions on off-highway vehicular travel; and discontinuing certain

normal activities such as welding or felling operations which could become a hazard.

Law Enforcement

Changes in fire prevention statutes by the State Legislature in 1969 were minimal. One change permits the State Forester to adopt regulations to vary requirements for removing flammable vegetation from areas surrounding structures if their exteriors are constructed of non-flammable materials; or under certain other conditions depending on contents or composition of buildings. The statute now requires the occupant or owner to file with the State Forester a written consent to inspection of the interior and contents of a structure before a written variance shall apply.

Effort to provide for safe, convenient solid waste disposal was continued. Another change in the Public Resources Code permits use of containerized portable rubbish dumps, which cost far less to make "fire safe." The amendments require that if a dump is maintained in a fireproof container used primarily to transport rubbish for final disposition, flammable material must be cleared for a minimum distance of 30 feet from the container, instead of 150 feet as previously required. Land and clearance costs for local rubbish dumps thus can be significantly reduced. Better waste disposal can be provided to widely scattered rural communities with equal or less risk of wildfire originating from refuse disposal sites.

Criminal prosecutions for fire law violations in areas directly protected by the Division were 11% higher than in 1968: 410 arrests made for misdemeanor violations resulted in 337 convictions; and 134 cases were initiated against juveniles through the Juvenile Court system. Thirty cases were initiated against adults for felony violations of fire laws. Twenty felony convictions were obtained, while final disposition of other adult cases is pending or resulted in pleas of guilty to lesser charges; commitments to mental institutions; or prosecution for other crimes committed concurrently with arson.

Recovery of fire suppression costs, pursuant to Section 13009 of the Health and Safety Code, was made for 285 fires, amounting to \$157,512. Additional letters of demand have been sent or suits filed, for suppression costs of fires occurring in prior years, amounting to

\$1,007,003. These claims will be settled by negotiation or court decision.

Incendiary fires remain a major enforcement problem; they were the cause of 19% of all man-caused wildland fires in State Responsibility Areas. The Division conducted two major felony investigations during 1969 that required investigative task forces composed of personnel from all Districts. The "Santa Cruz Caper" resulted in coordinated air and ground surveillance of a suspect with aid from the Santa Cruz District Attorney and Sheriff. The investigation resulted in a Grand Jury indictment against a single subject on 38 separate counts; 30 for willfully and maliciously burning lands of another; and 8 for attempted arson. The accused pleaded guilty to three counts and was sentenced to state prison for a term of 1 to 10 years on each count, to be served concurrently.

Incendiary fires plagued the table grape industry in southern Tulare County and northern Kern County during the summer of 1969. Losses of more than \$1,173,722 in packing sheds, boxes, and equipment were sustained. On September 19, the Division was instructed to make a continuing intensive investigation of the fires. The backlog of felony investigations (190+) completely over-taxed our ability to conduct such investigations using only personnel within the District and Ranger Unit. Intensive investigation continued into November. Direct operating expenses for the investigation amounted to \$11,000. Investigation task force operations required

lengthy ground surveillance and use of several interrogation teams. More than forty officers were assigned to assist in the investigation, which resulted in filing nine felony complaints; two additional complaints are still pending.

Concentration of investigative forces produced positive results in these and other felony investigations during the year. Problems of dispatch, communications, and organization require further attention to improve enforcement effectiveness and mobility, and to reduce costs.

Plans for 1970

Plans for 1970 provide for continued experimentation with television spots. Evaluation of the Headstart Fire Prevention materials will be continued, on a limited basis. Complete analysis of data from the Fire Prevention Study of fire prevention agency employees will be published in synopsis form. A study will be initiated of how various fire ignition brands react in forest fuels in a variety of environmental conditions. Development and evaluation of a railroad engine spark arrester will be completed. Further evaluation will be made of teaching methods by individual instruction of young children. A re-survey of the attitude and knowledge of Butte County residents in fire prevention will take place; experimental roadside signs will be tested to compare their effectiveness with standard fire prevention signs and messages.

MANAGEMENT SERVICES

The Management Services Section of the State Forester's staff provides essential assistance and services to other staff sections in developing management plans and carrying out managerial activities. Particular areas of responsibility include collecting and analyzing data; estimating costs; budget planning and preparation; and support and assistance in optimum utilization of resources, especially manpower. Management Services also assists and provides guidance in purchasing; storing supplies and equipment; and in property and records management.

Manpower Utilization and Personnel Management

During 1969 there were 266 new permanent appointments to fill vacant positions in the Division. On December 31, 1969, there were 2,641 year-long employees, and at the peak of fire season total employment reached 4,368, including seasonal drivers and fire fighters.

Restoration of the Division's professional forester recruitment program made it possible to hire six graduate foresters as Forestry Graduate Trainees. In addition, six highly qualified

Division employees were appointed to career training positions as Forestry Field Trainees.

Thirty-five employees retired during the year; ten for disability reasons. Among those retiring were three completing long careers with the Division.

- C. R. Clar, Assistant Executive Officer, State Board of Forestry, culminated 42 years with the Division. During his 42 years he also served as Chief Deputy State Forester, and developed what became known as the "Clar Plan," which established the fire plan framework around which the present Division of Forestry is organized.
- Truman Holland, State Forest Ranger III, Riverside Ranger Unit, retired after 39 years of service.
- John Wade, State Forest Ranger II, San Benito-Monterey Ranger Unit, retired after almost 37 years of service.

Others who retired during 1960 after completing careers with the Division of Forestry were:

Francis W. Bradford, Associate State Forest Ranger

Joe F. Luttrell, Forestry Equipment Operator

Allen W. Day, Forestry Foreman II

George W. Stephens, Forestry Foreman I

Kenneth Van Volkenburg, Forest Fire Truck Driver

Charles R. Bowen, Forestry Foreman I

Joe E. Hughes, Forestry Foreman II

Milton R. Kiefer, Carpenter Foreman

Florence Christiansen, Stenographer II

Hazel A. Barsotti, Clerk Typist II

Amelia R. Mitchell, Clerk II

Julius C. Chapman, Forestry Cook I

Delbert F. Winter, Forestry Foreman I

Clifford C. Hamilton, Forestry Foreman I

Vernon M. Arnold, Assistant State Forest Ranger

Archie M. Pohler, Forestry Foreman II

Wayne R. Beck, Forestry Foreman II

William F. Hendsch, Forest Fire Lookout

Wilbert Wetherbee, Forest Fire Truck Driver

Louis F. Taurman, Construction Inspector

Henry H. Hill, Forestry Foreman II

Myrle S. Fleming, Stenographer II

Viola Friend, Forestry Cook I

Luther R. Routt, Assistant State Forest Ranger

Robert Hanshaw, Forestry Foreman I

Culver Stone, Forestry Foreman II

Orel E. Gordon, Storekeeper II

Ray F. Fairbairn, Forestry Foreman II

James D. Dawson, Forestry Foreman II

Richard R. Wilkins, Forestry Foreman II

William H. Brownlee, State Forest Ranger I

Floyd L. Otter, Forester II

A national Award for Excellence in Fire Control Research was presented to Clint Phillips, State Forest Ranger, Sacramento Headquarters, at the State Capitol, in February. John W. Deinema, Regional Forester of the U. S. Forest Service made the presentation in ceremonies attended by John Harmer, State Senator; James

Stearns, Director of the Department of Conservation; and Len Chatten, Assistant Deputy State Forester, representing State Forester Francis Raymond. In making the presentation, Deinema said that because of Phillips' efforts, quick field application of fire research results has greatly enhanced effectiveness of research knowledge and the level of professional competency of the entire research organization. Deinema also said that during the last 10 years Phillips has demonstrated outstanding capabilities in working with people, in training, and in communicating fire research results to others. He has provided excellent cooperation between the U. S. Forest Service and the California Division of Forestry in all areas of mutual benefit. John Harmer, State Senator from Glendale, initiated a Senate Resolution in recognition of Clint Phillips' achievement in Fire Control Research.



A national award for Excellence in Fire Control Research was presented to Clinton (Clint) B. Phillips, State Forester Ranger, at the State Capitol. The award was made by Regional Forester John W. Deinema, U. S. Forest Service (left). The presentation ceremony was attended by (l. to r.) Senator Hugh Burns, Clint Phillips, Senator John Harmer, and James Stearns, Director of Conservation.

DIVISION OF FORESTRY BUDGET - Fiscal Year 1968-70

Summary:

(1) Fire prevention: state responsibility	\$ 3,091,205
(2) Fire control: state responsibility	30,384,736
(3) Fire protection: local government contract	6,548,516
(4) Forest, range, and watershed management	2,167,858
(5) Conservation camp	4,315,104
(6) Civil defense and other emergencies	75,000
(7) General support	3,021,706
(8) Capital outlay	1,250,000
Sub-total	\$ 50,854,125
Reimbursement	-8,854,809
TOTAL NET BUDGET	\$ 41,999,316

Program Augmentation:

- (1) A sum of \$112,316 was provided to recruit and train young men to fill career administration and professional forester positions. The program provides not only for recruitment from college, but an opportunity for career development among existing employees.
- (2) A sum of \$133,477 was provided to hire two contract helicopters and crews. In some areas of the state congested freeways and highways slow the travel of fire fighting forces. In extremely remote areas, fire fighters are hampered by the lack of roads and other conventional means of access. Today's modern helicopter can provide a valuable tool for overcoming these travel difficulties.
- (3) A sum of \$50,000 was provided for the purpose of a Dispatch Command and Control Automation Feasibility Study. This will be accomplished by an in-depth engineering evaluation of dispatching needs and capabilities to improve system design, operation, planning, and maintenance for meeting present and future requirements.
- (4) A sum of \$10,955 was provided for an Assistant State Forest Ranger in Owens Valley Ranger Unit. This unit is currently without a ranger-in-charge. Alternative procedures have not proven satisfactory; support is necessary to provide the above position for management of fire prevention and fire control activities in Owens Valley Ranger Unit.

ENGINEERING AND CONSERVATION CAMPS

The Engineering and Conservation Camps activity performs in a dual role. Engineering and construction responsibilities are principally concerned with establishing and maintaining standards, and performance of necessary work related to land acquisition; mapping and surveying; graphics; and design, construction, and maintenance of facilities.

The Conservation Camps are operated jointly with the Department of Youth Authority (wards), and the Department of Corrections (inmates). They are designed to provide a living-and-working experience in a beneficial outdoor environment that will be conducive to rehabilitation of wards and inmates assigned to the camps. In addition they function to provide an essential trained force that is highly effective for fire fighting and other resource protection and conservation work.

Engineering and Construction

In addition to the Pine Grove Youth Conservation Camp, other major projects completed during 1969 were a barracks-messhall and equipment building at the new Alturas Forest Fire Station in Modoc County; a replacement equipment storage building at the Riverside Ranger Unit Headquarters in Perris; a complete fire station facility in Contra Costa County identified as the Sunshine Forest Fire Station; and a new messhall for the Santa Rosa Ranger Unit Headquarters. Two replacement lookouts were constructed: Mt. Woodson in San Diego County, and Pilot Peak in El Dorado County. In addition, 32 projects were completed involving structures, including communication facilities, offices, barracks, lookouts, shop buildings, and messhalls.

Water development projects included nine standard 10,000 gallon cisterns completed, and seven water system developments.

Several bridges were added to the Division of Forestry's inventory.

Four miles of powerline have been transferred to public utility companies.

The Division has continued its policy of converting Forestry telephone lines to commercial facilities as the public utilities build out to our more remote locations. Total mileage of Forestry telephone lines is now slightly under 1,000 miles.

Four administrative maps were updated and a large number of graphic materials produced.

Conversion of some Forestry roads to county public roads has resulted in a reduction of nearly 50 miles of Forestry road. The new total is 3,846.5 miles of CDF fire access truck trails and administrative roads.

The Division of Forestry has been assigned control and possession of seven sites, which includes three forest fire stations, three lookouts, and one conservation camp site.

Right-of-way activity was reduced somewhat from 1968, with 200 parcels having been processed during 1969.

Conservation Camp Programs

There were 33 conservation camps in operation in 1969. At the 29 adult camps, a population of 2,380 inmates was maintained, while 320 wards of the Department of the Youth Authority were assigned to four youth conservation camps.

Although there were no changes in number of camps that were operational during 1969, as compared to 1968, there were three significant changes in the program last year.

After the new Ben Lomond Youth Conservation Camp was dedicated, the ward capacity was increased from 70 to 80.

Construction on the Pine Grove Youth Conservation Camp was completed in 1969 and with the new buildings, this camp also was brought up to the standard 80-ward size. This was an increase of ten wards.

With termination of the contract between the Division of Forestry and the Office of Economic Opportunity, the Oak Glen Job Corps Conservation Center was closed. The last Job Corps enrollee departed on May 13, 1969. Rather than leave this camp vacant, the 80 inmates from Don Lugo were transferred to Oak Glen, effective August 1, 1969. The Don Lugo Camp is now inactive.

With completion of the Pine Grove Camp in Amador County, all the earliest camps, which consisted mostly of relocated military surplus buildings acquired immediately following World War II, now have been replaced with modern structures. The oldest camps which are currently in use date from 1949. Nearly all buildings

presently in use were designed and constructed especially for the camp program.

Distribution of Conservation Camps

District	Number of Camps	Wards	Population Inmates	Total
North Coast	7	—	580	580
Sierra Cascade	6	—	500	500
Central Sierra	6	160	340	500
San Joaquin	4	80	240	320
Central Coast	3	80	140	220
Southern California	7	—	580	580
Totals	33	320	2,380	2,700

The four Youth Conservation Camps are located as follows: Pine Grove and Washington Ridge are in the Central Sierra District; Mount Bullion Camp is in the San Joaquin District; and Ben Lomond Camp is in the Central Coast District county of Santa Cruz.

One way to illustrate the diversity of activities of the Conservation Camp Program is to list the variety of emergencies in which inmates and wards were called upon for work during one month—February 1969. Within this period, crews from the camps worked on four different types of emergency projects in widely separated geographical areas of the state. These were forest fire, oil slick, flood fight, and snow removal: One camp—Vallecito, in Calaveras County—sent crews to work on three of these unusual assignments. Crews were dispatched to the oil slick, flood fight, and snow removal jobs, all within the one month period. Don Lugo, in

the Southern California District, was the only camp which sent crews to fight a forest fire in February.

Type of Emergency	Location	Man-days
Forest fire	Southern California	75
Oil slick operations	Santa Barbara	7,428
Flood fight	Statewide	7,489
Snow removal	Squaw Valley	1,339

The primary activity of forest fire control accounted for 65,267 man-days of effort. This represents 7.97 percent of the total effort of the camps.

Work Performed by Conservation Camps During 1969

Activity	Man-days	Percent of Total
Fire Suppression, Mop-up, and Patrol	65,267	7.97
Pre-suppression and Facilities	92,259	11.27
Fire Defense Improvements	173,325	21.16
Forest, Range, and Watershed Management	31,681	3.87
In-Camp Projects	52,894	6.46
Camp Services	153,832	18.78
Building and Equipment Maintenance	57,011	6.96
Training	15,460	1.89
Game and Fish Habitat Improvement	14,701	1.79
Public Campground and Recreational Development	57,605	7.03
Search and Rescue	1,117	.14
Other Services	103,887	12.68
Totals	819,039	100.00

PUBLICATIONS OF 1969

Activities of the Division are reported, and results of research made available in a variety of publications. Those listed below were distributed during 1969. They were prepared by members of the Division, or resulted from cooperative projects with other agencies. All are directly related to work with the Division of Forestry.

Papers and Reports Processed by Division and Department

“Annual Forest Practice Report—1968.” 6 pp.

“Annual Report of Forest Fire Research, 1968-69.” California Fire Control Notes No. 21, 12 pp.

“A Remote Control Spray Boom,” by William A. Harrington. Range Improvement Studies No. 17, 3 pp.

“A Test for Continuous Monitoring of Fire Danger,” by William Innes. California Fire Control Notes No. 20, 26 pp.

“Brushland Range Improvement—1968.” 22 pp.

"California Cone Crop for 1969," by C. J. Eden. State Forest Note No. 40, 7 pp.

"California Conservation Camp Program--1968." 61 pp.

"California's 1968 Fire Weather Severity," by William Innes and Rex J. Hess. California Fire Control Notes No. 19, 15 pp.

"California State Forests--1968." 13 pp.

"Children Caused Fires," by John Ferguson. California Fire Prevention Note No. 3, 8 pp.

"Children Caused Fires." A Board of Forestry Presentation, moderated by Howard E. Moore, July 1968. 47 pp.

"Children Who Set Fires: An Exploratory Study," by Ellen Y. Siegleman. 81 pp.

"Emergency Revegetation of Burned Watersheds--1968." 16 pp.

"Excerpts From State Fire Laws Applicable To Forest Fire Prevention." 6 pp.

"Extinguisher Test Standards and Record of Extinguisher Evaluation," by J. D. Taylor. California Fire Prevention Note No. 2, 10 pp.

"Forest Fire Potential for 1969," A Board of Forestry Presentation, moderated by Howard E. Moore, May 1969. 80 pp.

"Forest Nurseries, Annual Report, 1968-69," by C. J. Eden. 10 pp.

"How to Cure Mountain Misery," by Ronald S. Adams. 23 pp.

"Kids and Fires" by Lendon H. Smith. California Fire Prevention Note No. 4, 3 pp.

"Operational Aspects of Chemical Stump Treatment for *Fomes annosus* Protection on Boggs Mountain State Forest," by Clifford E. Fago. State Forest Note No. 38, 4 pp.

"Production of California Timber Operators in 1967," by Daniel Dotta. State Forest Note No. 37, 6 pp.

"Project Butte." A Board of Forestry Presentation by Ordean Monsen, Bill J. Teer, Donald J. Keys, and David E. Sharpe. 13 pp.

"Reforestation Studies, 1968," by Ronald S. Adams. 19 pp.

"Soil-Vegetation Surveys in California." (Revised 1969). 31 pp.

"Tahoe Vegetation--Soil Protection Symposium--Summary and Proceedings." 83 pp.

"The State Forester's 1968 Report." 33 pp.

"Use of a Portable Weather Unit in Controlled Burning Weather Forecasting," by William Harrington. Range Improvement Studies No. 18, 3 pp.

"Wildland Research Plan for California" (Revised 1969). 39 pp.

Publications Resulting from Cooperative Effort of Division

"Adequate Presuppression Manning Depends on Accurate Fire Weather Observations," by A. R. Pirsko and P. G. Scowcroft. Fire Control Notes 30 (1) : 7-8.

"Airflow Over a Heated Coastal Mountain," by Michael A. Fosberg. *Journal of Applied Meteorology*. June 1969.

"A Study of the Effectiveness of Specific Teaching of Conservation and Forest Fire Prevention to Children in Kindergarten and Grades One, Two, and Three of Selected Schools, Butte County, California," by Frank H. Gladen and Helen S. Carkin. U. S. Forest Service, PSWF&RES, and California Division of Forestry.

"Automated Forest Fire Dispatching--A Progress Report," by E. T. Tolin, J. B. Davis, and C. Mandt. *Fire Technology*, pp. 122-129. May 1969.

"Biology of the Phantom Hemlock Looper on Douglas-fir in California," by Boyd E. Wickman and Richard H. Hunt. *Journal of Economic Entomology*, Volume 62, Number 5. October 1969.

"Control of Chamise Regrowth with Phenoxy Herbicides. . .Affected by Sprout Age, Date of Application," by T. R. Plumb. USDA Forest Serv. Res. Note PSW-192, 1969. 5 pp.

"Control of Insect Behavior by Natural Products," by D. L. Wood, R. M. Silverstein, M. Makajima. *Science* 164 (3876): 203-210. 1969.

"Critical Fire Weather Patterns in the Conterminous United States," by Mark J. Schroeder. ESSA Technical Report WB-8. January 1969.

"Data Processing Programs and Procedures for Analyzing the Continuous Forest Inventory of Latour State Forest," by Lee C. Wensel. 31 pp.

"Electrical Ignition for Prescribed Burning," by Harry Schimke, John D. Dell, and Franklin R. Ward. USDA Forest Serv. Pacific Southwest Forest and Range Exp. Sta. 14 pp.

"Elementary Allocation Models. . .How to Use Them in Forestry Operations," by J. B. Davis. USDA Forest Serv. Res. Note PSW-187. 8 pp.

"Evaluation of Mestranol as a Reproductive Inhibitor of Norway Rats in Garbage Dumps," by Rex E. Marsh and Walter E. Howard. *Wildlife Management*, Vol. 33, No. 1. January 1969.

"Fire Hazard Reduction Guide for Roadsides," by U. S. Forest Service, Region 5, and California Division of Forestry.

"Influence of Weather on Harvesting of High Elevation Christmas Trees," by Arthur Scarlett, Dewayne Gilbert, Charles Wagener, and Ed Gilden. *California Agriculture*, Volume 23, No. 8. August 1969.

"Insect Problems in Forest Recreation Areas," by D. L. Kahlsten, R. Garcia, J. E. Prine, and R. Hunt. *California Agriculture*, Volume 23, No. 7. July 1969.

"Leaf Initiation Rates and Volume Growth Rates in the Shoot Apex of Chrysanthemum," by A. R. Berg and E. G. Cutter. *American Journal of Botany* 56(2): 153-159.

"Mestranol as a Reproductive Inhibitor in Rats and Voles," by Walter E. Howard and Rex E. Marsh. *Wildlife Management*, Vol. 33, No. 2. February 1969.

"The Little Fire That Remained Little," by Lloyd Thorpe. *American Forests*. November 1969.

"Tracer Shotshell Fires: A New Hazard," by J. M. Dodge. *Fire Control Notes* 30(1): 5.

"Use of Air Tankers Pays Off. . .A Case Study," by Clive M. Countryman. USDA Forest Serv. Res. Note PSW-188, 1969. 4 pp.

Printed Articles and Books (by Division Personnel)

"California Government and Forestry--II; during the Young and Rolph administrations," by C. Raymond Clar. 319 pp.

"Evolution of California's Wildland Fire Protection System," by C. Raymond Clar. 35 pp.

